PART IX
THE INFECTIOUS DISEASES

GENERAL DISCUSSION

This group includes a number of diseases which have many factors of etiology and treatment in common. All of them are infectious and most of them are due to bacteria. It is quite possible that protozoan agents may be present in some cases. All owe their presence to some form of uncleanliness. They are a disgrace to modern civilization. Children, with their gregarious habits in regard to the use of pencils and chewing gum, transmit disease germs from one to another with truly remarkable celerity. Even with such facilities for the transmission of infectious agents comparatively few children contract these diseases, even in an epidemic. This fact is due to the immunity of the resistant children.

Immunity depends upon many factors. Certain diseases confer immunity to succeeding attacks—this is the basis for certain types of so-called preventive medicine. The blood serum and the white blood cells appear to be actively bactericidal. The skin and the membranes lining the body cavities are normally impermeable to bacterial invasion. (A very few pathogenic bacteria are persistent and able to live upon normal body tissues and fluids.)

The skin and mucous membranes resist bacteria only so long as they are intact. Diseased tonsils, decayed teeth and abrasions are important gateways for the entrance of pathogenic bacteria into the body. The value of the blood as a factor in immunity is diminished when it does not circulate freely or when it contains certain toxic elements.

The lymphoid tissues are important agents in immunity. Normal tonsils are included with the spleen and lymph nodes.

The place of bony lesions in lowering immunity depends upon the relationships already stated. Lesions of the upper thoracic and cervical regions predispose to infection of the mouth and the upper respiratory tract. By lowering the resistance of this area of the body infectious agents may gain entrance into the body and produce systemic disease. This is especially the case in scarlet fever, measles, diphtheria, and a number of other acute infections. The fifth thoracic to the first lumbar spinal segments control the action of the liver, spleen, pancreas and the gastro-intestinal tract. "A rigid lower thoracic spine is an important factor in lowering immunity and vigorous treatment to this spinal

area to the liver and spleen raises the body resistance."—C. A. Whiting.

General immunity is lowered through poor nutrition, the retention of bodily waste, reduced alkalinity of the blood, fatigue and overwork, lack of sleep, lack of exercise and of fresh air, disturbed digestion, harmful emotions, especially fear, and the after-effects of many drugs, including serums used in therapy. Almost any one of the acute infections lessens resistance to other acute infections and to tuberculosis.

Treatment. Any child who is sick should be separated from other children until the noninfectious nature of his malady is evident. Especially during an epidemic no sick child should be allowed to be with other children. The stringency and length of the time of quarantine depends on the nature of the disease after diagnosis becomes possible. The prodromal symptoms are very much alike for all the exanthematous diseases; therefore it is not possible to make a certain diagnosis until after the disease is easily transmissible. During this stage the treatment should be thorough. The entire spinal column and the ribs should be examined, and all lesions, bony, muscular, or other, corrected. Solid food should be stopped immediately. Fruit juices and plenty of water should be freely given. If the child is very hungry he may be allowed to eat raw apples, lettuce or other cellulose foods. Berries with seeds, starch, sugar, meat, eggs are to be denied. If either diarrhea or constipation is present an enema is to be given. Many doctors advise the enema of normal salt solution as a part of the routine procedure in all cases. The child should be kept in a warm, well-ventilated room and be dressed very lightly. He should be put to bed as soon as the temperature goes above 100°. He may play quietly, playthings must be burned upon his recovery. All rugs, hangings, etc., should either be removed or should be such as can be thoroughly boiled after the child has recovered. Pictures should be removed from the room or should be burned later. During convalescence books, pictures and inexpensive toys should be provided which can keep him busy and happy and can be burned at the termination of quarantine.

The fever can usually be lowered by a few minutes' steady pressure between the transverse processes of the eighth to the eleventh thoracic vertebræ or over the suboccipital triangles. This pressure should be given after the ordinary treatment. In the intervals of treatment, cool baths lower the temperature. The patient may be placed in the tub of water at about the body temperature and cold water added to about 80°. The patient may lie in this bath from two minutes to thirty minutes, according to his comfort and the effect produced upon the body temperature. A sponge bath is better under many circumstances. This should

be slowly given with water at or slightly below the temperature of the body. Only a small area of the body should be exposed unless the temperature of the room is high.

The odor associated with exanthematous diseases can be somewhat relieved by adding a few drops of carbolic acid, creolin, soda or borax to the bath water. Plentiful ventilation is important. An open ammonia bottle or smelling salts may give relief.

The itching and burning of the skin can be relieved by the addition of the substances already mentioned to the bath water, and by ointments of cold cream, white vaseline, etc., to which may be added talcum powder, starch, small amounts of soda or boric acid, zinc oxide. Powders should be used over moist or weeping surfaces. These may be of browned flour, corn starch, talcum, or any other smooth powder. To any of these may be added small amounts of boracic acid or soda. Lotions may be applied with a soft cloth. Strips of gauze may be soaked in these and laid over the areas of greatest painfulness. Lotions are made of water with a little alcohol or glycerine to which is added a small amount of carbolic acid, creolin, zinc oxide, powdered calamine or any other slightly antiseptic or bland soothing constituent. Any lotion which does not injure the skin and which feels good may be used for this purpose.

Most of the exanthematous diseases have a tendency to infect the conjunctivæ and thus lead to serious eye troubles. It is difficult to avoid light and also to have suitable ventilation in the room. Ventilation is of urgent importance. It is better to shade the eyes with dark glasses or in some other way and to have good ventilation than to darken the room at the expense of fresh air.

The patient should receive thorough osteopathic treatment twice each day in the beginning of the disease, then once each day until convalescence is established. He should receive careful examination after recovery is complete in order that any sequel may be speedily recognized and treated.

After the fever goes down the patient is usually very hungry. His diet should be largely of fruit and vegetables with milk, eggs, broths, according to his age and general habits. Too speedy a return to the mixed diet may result in digestive disturbances. Too much meat or other concentrated food may add to the danger of kidney disturbances. Too speedy a return to ordinary activity may throw too great a burden upon the heart and permanent valvular injury may result. Deficient ventilation during course of the disease and carelessness in clothing or any exposure to the weather during convalescence increases the danger of pulmonary complications. It is much better that convalescence be prolonged a few days than that permanent heart, kidney or pulmonary diseases should be allowed to occur.

"To correct bony lesions in acute diseases, the physician must take time and care, as the patient is suffering and not in a mood to be handled quickly or roughly. The correction of the bony lesions is not so difficult when the condition and position of the abnormal structure are clear in the physician's mind. When the lesion is corrected with the proper ease, the physician will feel the movements of the abnormal structure slide or slip into place so easily that it is ofttimes surprising.

"The question might arise: 'Is it safe to correct a bony lesion in a severe acute disease when the patient is suffering, temperature high, and all things point to a severe toxic condition, as the system is under a severe strain due to accumulation of the toxic poisons?' One thing we need in a case like this would be harmony, not only of structure, but normal physiological functioning as well. Therefore, let us correct the lesion. We may have to relax the unequal muscular contraction which not only tends to maintain the lesion, but also produces a tension which interferes with the normal nerve forces as well as the blood and lymphatic system. The object is to procure normal action and function of structure as well as to assist nature in producing a normal physiological action. The amount, length, and technique of your treatment must be determined by the condition of the patient."—E. R. Proctor.

Prophylaxis. If every child who is sick could be immediately isolated from other children until the diagnosis is made it would go a long way to stop the spread of contagious diseases. Children at school must be taught to keep things out of their mouths and to wash their hands before eating. This is a hard task. The old idea that children must at some time have the diseases called "children's" is a dangerous fallacy and one which is responsible for many deaths and a very great number of chronic invalids. Children should be protected from even the mildest of these diseases very carefully. Every one leaves a gate open for its successor and tuberculosis is usually ready to enter at any gate. The typical course of the disease as generally described is greatly modified by early, frequent and vigorous treatment which always should include the increased mobility of the lower thoracic spine and raising of the lower ribs. Other treatment depends upon the conditions as found at examination, and should include correction of vertebral and costal subluxations, as well as of other structural perversions wherever possible. In every case the urine should be tested for albumin, sugar and the microscopical findings every few days. The heart should be watched during every acute disease. With the first appearance of albumin or casts or kidney epithelium in the urine the treatment for acute nephritis should be begun. With the first sign of cardiac complications treatment for pericardial and endocardial diseases should be added to that already described for exanthematous. In this way the usual sequelæ may be avoided.

The most common diseases due to bacilli are tuberculosis and leprosy, due to acid-fast bacilli; typhoid and typhus, affecting chiefly the intestinal tract; influenza, pertussis and diphtheria, affecting chiefly the respiratory and pharyngeal areas. The diseases due to cocci include pneumonia, meningitis, infantile paral-

ysis, erysipelas and rheumatism. Spirochætes are responsible for relapsing fever and syphilis.

Diseases which are usually contracted from animal associates include plague, hydrophobia, tetanus, and others less frequently. Many of the most serious of the infectious diseases are due to agents not yet recognized. Mallory's studies of scarlet fever should be mentioned. Recent development of routes of travel, which no doubt will become freely accessible at the close of the war, render the tropical diseases of greater interest than heretofore. The protozoan diseases are of especial interest because of their frequency and malignancy in tropical countries and the possibility of their becoming acclimated among us.

CHAPTER XLII

TUBERCULOSIS

Tuberculosis is an acute and chronic infectious and contagious disease caused by the bacillus of tuberculosis, characterized anatomically by the formation of nodular bodies or diffuse infiltrations, and clinically by symptomatology varying with the tissues or organs involved.

Etiology. The essential immediate cause of the disease is the tubercle bacillus. This organism, almost omnipresent, is rather more plentiful in the northern latitudes.

The most important predisposing factor is the bony, muscular, or ligamentous lesion. Practically every person who suffers from any tubercular infection has diminished flexibility of the lower thoracic spinal column. The nature of the lesion varies as does the tubercular process, but the most frequent condition is the characteristic straight spine, infantile chest and flat interscapular region with drooping and immobile ribs.

"The spinal outline characteristic of tuberculosis and of the pretubercular stages presents the following peculiarities: The cervical spine presents various abnormalities, usually lesions involving single vertebræ and associated with irregular muscular tensions. The upper thoracic spine is anterior, the ribs drooping and rather more freely movable than normal; the vertebral articulations are less movable than normal; the tissues in the neighborhood of the upper two or three dorsal spines are abnormally sensitive and the muscles innervated from these segments are contracted irregularly when the disease involves the apices. The lower interscapular region is found sensitive and these muscles are contracted when the lower lobes of the lung are involved, and the location of these sensitive areas may be employed in the localization of the lung area infected.

"In every case recorded in this clinic, lesions involving the area of the origin of the upper and middle splanchnic nerves have been found. The typical tuberculosis spine must include lesions of the lower dorsal area. Probably these lesions are predisposing factors in tuberculosis, partly because of the effects produced upon nutrition thereby, but doubtless the lack of the normal mobility of this part of the spine prevents the normal stimulation of the liver, the spleen, perhaps the pancreas, thus the normal opsonic index is lost, and immunity broken. The treatment of tubercular cases should include careful attention to the splanchnic area, the maintenance of the normal mobility and structural relationship of the entire spinal column, and such stimulating movements to the ninth and tenth thoracic neighborhood as is indicated in each individual case."—C. A. Whiting.

The immunity lowered and the bacilli within the body, the area ultimately affected depends at least to some extent upon the existence of the bony lesions and their effect upon the circulation of the blood and the nutritive condition of the different parts of the body.

Lesions responsible for the hospitality of certain tissues to tubercular invasion vary according to the locality affected. Lesions of the upper thoracic spine and upper ribs are present when the first injury is to the upper lobes of the lungs, as is so often the case. Lesions of the midthoracic region are associated with injury to the middle and lower lobes of the lungs. Laryngeal tuberculosis is more frequent in those who have also lesions of the cervical vertebræ, and contractions of the cervical muscles, as well as lesions of the upper thoracic vertebræ.

Intestinal tuberculosis is associated with lesions of the lower thoracic spine, as is tuberculosis in almost any part of the body; in this case the general lowering of the bodily resistance is associated with the specific area involved. Why it is that the intestinal tract so often escapes is not easy to determine.

Kidney lesions are associated with disturbances in the vertebræ and neighboring tissues of the eleventh and twelfth thoracic segments, from which arise the vasomotor nerves to the kidneys, and the secretory nerves to the suprarenals. So it is everywhere —in almost every case efficient factors are usually found which are more or less responsible for the presence of the disease in the organs affected. Naturally, the correction of these lesions as found is important; naturally, also, this correction must be made in such a manner as to prevent injury to the tissues already so seriously diseased.

Bad air, poor nutrition, lack of sunshine and exercise are also most important predisposing causes.

"It is a well-known fact if there were no tubercle bacilli there would be no tuberculosis; also if there be no suitable soil there would be no tuberculosis.

"The fact still remains that humanity has not yet become civilized to the point of cleanliness, and so long as part of the human race persists in living in filth and spreading it broadcast human beings will pay the penalty with a wrecked body and too often death from tuberculosis."—W. J. Hayden.

No age is free from the disease, though it attacks the young rather more frequently than the old. In young subjects the bones and bronchial lymphatics are most liable to be invaded. From puberty to middle age the disease attacks the lungs most frequently, while in old age the intestines are rather more frequently attacked.

The sexes are about equally affected throughout life. Pregnancy is a cause of acute exacerbation of the disease, but probably not of its first appearance. No races seem to be exempt. Negroes are very susceptible. Its ravages are especially severe among savages who have become sufficiently civilized to dwell in houses. Jews are frequently supposed to be almost exempt, but in large cities where Jews of the poorer class are herded together in tenements, tuberculosis is very prevalent. Generally speaking the poor

are more subject to the disease than the rich on account of the poor nutrition and imperfect sanitation of the former.

Occupations which compel inactive, indoor living, especially in bad air, are those in which tuberculosis occurs most frequently. Tailors, for example, sitting in cramped positions, in badly ventilated, overheated rooms, with the lint from cloth flying in the air, are especially subject to the disease.

Pathology. The characteristic pathology of tuberculosis is that of the tubercle, a semitransparent gray gelatinous body, just visible to the naked eye, which later becomes opaque, and softens in the center. They are produced by the local specific irritant action of the bacilli and may be few or numerous in the affected organs.

The growth of the bacilli in the tissues excites a proliferation of the neighboring cells. Certain of these cells which are situated in the center, as a result of an increase in their size and repeated division of their nucleus, or by fusion of contiguous cells, become giant cells. Bacilli are found in these endothelial and giant cells. Around this cell mass is a zone composed of small round cells surrounded by a network of fibrous tissue. This tubercle being nonvascular is open to degenerative changes as caseation and coagulation, encapsulation, or calcification.

The bacteria themselves being walled in by the connective tissues of increasing density ultimately die. The dead bacteria, the plasma cells, the old blood corpuscles which are entangled with them all become degenerated into a cheesy mass. If no secondary infection occurs the complete death of the bacilli and the increasing thickness of the connective tissue wall around the tubercle terminates the process. If, however, the ordinary pyogenic bacteria gain entrance into the injured tissues or into the tubercle itself pus is formed. If the staphylococcus is the invading agent the abscess formation is rather slow and chronic, and the health of the patient is not materially affected thereby. If the streptococcus of any of the ordinary varieties should be the more important invader the abscess formation is rapid, the amount of pus plentiful, and the patient's health suffers very severely. In either case the tubercle becomes broken down into soft pus and the condition which is called tubercular abscess is present. Tubercles may grow together and become confluent, thus causing a consolidation of very large areas of the lung tissue. These being broken down result in the formation of abscesses and cavities of great size. The description of the tubercle as given for the lung applies with almost equal verity to tubercle in almost any part of the body, except the brain. In the brain the tubercle bacilli multiply upon the pia mater or upon any surface of the brain itself. The giant cells do not appear to any great extent in this locality and the connective tissue does not limit the growth of the bacteria to any one region. For this reason tuberculosis affecting the brain has a very rapid course, very severe symptoms, and usually speedy death.

In favorable cases, and in some tubercles even in fatal cases, the wall of the tubercle thickens, the pus and caseous material become inspissated, and the bacteria die; the whole or any part of the mass may become calcified. Recovery is practically complete when this condition is universal. Even quite large pus cavities may become healed, and filled with scar tissue, as is found after death from later tuberculosis or from other diseases. A partial immunity is established by recovery from tuberculosis; this is easily broken, and patients who are convalescent are very susceptible to reinfection, either from themselves or from other persons.

Diagnosis. Tuberculosis should be suspected when any patient loses weight gradually with no recognizable cause. An early finding is mild secondary anemia, with relative lymphocytosis and

diminished eosinophiles. This blood picture is almost pathognomonic. The X-ray shows very early changes in lungs or bones, and is helpful in any case.

Varying rales and other pulmonary sounds depend upon the size and location of the pulmonary lesions. The subnormal morning temperature with afternoon fever, not usually above 101° in the early stages, is usually associated with pyogenic infection. Night sweats are also indicative of pyogenic infection. (These may sometimes be referred to a habit of being too warmly clothed at night, however.)

The sputum varies with the progress and the type of the disease. Bacilli of tuberculosis may be abundant, or may be found with great difficulty. Inoculation of the sputum into laboratory animals may give the diagnosis in doubtful cases. Small white cheesy masses are characteristic; these may contain the bacilli in large numbers. The sputum may be very tenacious and heavy, or may be thin and frothy. It may contain alveolar cells, blood, ciliated cells, and various micro-organisms which include harmless as well as virulent forms.

Other diagnostic points are mentioned in connection with the various forms of the disease.

The **treatment** of tuberculosis should be based upon a recognition of the conditions as found upon the examination of each individual patient, together with the results of the investigations made into the pathology and the progress of the disease by various investigators.

The correction of whatever factors are found which have been instrumental in causing the disease, in each individual, and which are efficient in perpetuating the disease, must be removed as speedily as possible under the circumstances in each case. It must be urgently insisted upon that each patient is to some extent a law for himself, and the most speedy and complete recovery is secured only when the entire individuality of each patient, his history and his environment, his tastes and his mental habits, are taken into consideration.

The corrective work includes usually two factors: first, the lesions which lower the body resistance to tubercular invasion, and second, the lesions which permit the invasion of the particular tissues affected.

The correction of these lesions is easy in the earlier stages of the disease, but after the formation of cavities and abscesses is suspected, considerable care is necessary, in order to prevent the danger of injuring the walls of these formations, as well as of precipitating hemorrhages.

"What I would emphasize above all else is the necessity of administering corrective treatment with a full understanding of the pathological condition present, and the fact that the strictly osteopathic lesion present—and to be cor-

rected above all else—is a *posterior* upper lumbar and an *anterior* lower dorsal. With care and certainty in the correction of this lesion, with palliative treatment as indicated, and with attention to any other osseous lesion that may be present, the correction of which is not contra-indicated by the pathological lesion in the lung, you may be assured of an ultimate result not surpassed or even approached by any other system of therapeutics devised by the brain of man."—W. B. Meacham.

"In the main I believe it is better for the natural desires of the patient to determine the kind and quantity of food taken. I do not believe in the forced feeding of these patients. In many cases where the stomach is not disturbed at all the ordinary diet can be maintained. I believe one great essential in the treatment of tuberculosis is rest of the patient, both body and mind. * * * As said at the beginning, the real cause of the lowered resistance is the structural derangement of the spine and chest, and observation and many observers maintain that these lesions are located usually at the second, third, and fourth ribs, over the diseased lung. Lesions of the second and third dorsal should also be corrected. Treatment should be directed to the cervical region, which involves the lymphatics to the lung and to the vaso-motor area which supplies the lungs with blood and in turn increases the phagocytic activity of the leucocytes, which are the chief warriors against the invading germ. The clavicles should be raised, as also any ribs that are drawn down."—C. A. Williams.

Open air living is urgently desirable. In mild climates, day and night should be spent out of doors. In inclement weather, protection is necessary; there are many appliances which permit out-door air to reach the nose and mouth, while the rest of the body is kept in the warm room. It is most important that the patient be kept warm, dry and comfortable. Hot water bags and warm coverings are essential. Too great warmth upon retiring leads to more severe night sweats; these can often be avoided by having the bed warm upon retiring, but with rather less than the usual coverings. Indeed, many night sweats are due to nothing more than an excess of bed coverings.

The **change of climate** so often recommended is of chief value in the early stages of the disease, and must be advised only after a consideration of all factors concerned. A sudden change to a warm climate may be enervating; homesickness may be a serious matter; comforts of home may be lacking; the money spent in the change may necessitate lack of proper food; and in the last stages of the disease it is rare that leaving home at all is permissible. On the other hand, when the home conditions are not good; when nervous depression is a factor; when the patient lives where the climatic and sanitary conditions are bad; when he is sensible and willing to make an endeavor to recover his health; when he has money enough to live on without worry, a change of climate is stimulating and refreshing, and if this is associated with out-door life, complete change of scene, good food and proper structural corrections, recovery may occur in cases which appear almost hopeless at first. A sanitarium should be investigated before a patient is sent; there are many such places where every condition makes for the most speedy recovery; there are others where the sanitary conditions, crowding, and diet are absolutely

destructive. Happiness is important in these cases; fortunately tubercular patients are usually hopeful. **Altitude** is less important than other factors; the high altitude is usually advised; 3,000 to 6,000 feet is a very good height in good climates. Dryness is more constant at the high altitudes; cough is often relieved more by a lower altitude. If a patient does not get along well in the mountains, a lower place, usually not very near the sea, should be tried.

Diet is of importance, though perhaps of less moment than has been supposed. "Stuffing" is obsolete; increased swallowing does not necessarily mean increased nutrition. Tubercular patients need greater amounts of proteids, fats, and the vegetable salts than do normal people; this is because poor nutrition is an important factor in causing the disease, "a functional lesion," if the term be permissible. "Calory feeding" is a method used in some sanitariums; the patient is given a menu at each meal, in which the calory value of each article of diet is given. He must choose from this menu whatever kind of food he likes, but the sum of calories must equal the amount prescribed for him on examination each week. Intelligent patients may be taught to estimate calory values, and to diet themselves at home.

Many patients have ideas of what they can and cannot eat; these ideas may have been a cause of the original malnutrition, and they must be taught to overcome foolish prejudices. It is rarely advisable to force food down a rebellious gullet. Either the patient must be talked into a more rational viewpoint concerning food values, or the essential elements must be given him in some other way—possibly in unrecognized combinations. Foods which have been refused may contain elements necessary to nutrition; in such cases every effort must be made to replace these, or similar substances, in the diet list.

The diet must include fats, such as cream, butter, olive oil, bacon, especially. These are interchangeable; if any one is taken plentifully, others, which may not be appetizing, may be omitted.

Proteids are essential; eggs, milk and milk products; meat, especially beefsteak, chicken, and others; wild meats are appetizing, but probably not more nutritious; leguminous foods are nutritious, but cannot substitute for other proteids. The hemoglobin and myohematin of meat are important in building red blood cells, thus providing the necessary oxygen supply to the tissues.

Chlorophyll and the organic compounds of inorganic salts, found in vegetables, are valuable aids in tissue building. Some of these are broken down by cooking; so that some raw green vegetables should be eaten; if this is not possible, the juices pressed from the raw green vegetables may be added to broths until the digestion improves. Cooked vegetables may be eaten, but the

raw salads must not be omitted. Raw fruits, especially apples, are to be freely given.

The carbohydrates are usually eaten in sufficient quantities without special encouragement. White bread may be eaten if it is preferred and if it agrees with the patient's digestion. The dark breads are better. Too great a proportion of starches and sugars are to be avoided, but as long as the fats, proteids and vegetables are eaten in sufficient quantity, the carbohydrate question may usually be left to the appetite of the patient.

It is often useful to add to the number of meals eaten; a lunch of milk, fruit, broth, or some one such thing may be given at two or three hour intervals. A cup of hot milk or broth before arising and before retiring are good; each patient is a law to himself in regard to details; the important thing is to promote nutrition. During the feverish periods solid foods are best omitted; fruits or fruit juices or buttermilk may be taken, preferably cold. Pure, fresh ice cream may be eaten.

Symptoms must be treated as they occur. One rule is absolute: the patient must rest during the feverish periods. A temperature above 100° F. should send the patient to bed; he cannot be on his feet until the temperature goes down to 99° F. Exercise in the mornings, or in the absence of fever, may depend upon his inclination, usually.

Hemorrhages vary greatly; they give little information as to the prognosis in any case. Very severe hemorrhages may be fatal, of course. Rest is important; the patient should remain in bed after recognizable loss of blood; merely stained sputum is of no importance. Strong inhibition around the tenth thoracic spine lowers blood pressure, and lessens hemorrhage. Gelatine feeding seems to increase the coagulability of the blood, thus diminishing the danger of hemorrhage.

Cough may be distressing, and may prevent sleep. Thorough relaxation of the cervical and interscapular tissues helps in relieving cough; inhibition of the tenth thoracic region is useful here also. Sometimes the patient can stop cough by bending forward, with the muscles relaxed and the head falling forward; this is usually followed by easy expectoration of increased amounts of sputum.

Emaciation may cause pain upon the bones subjected to pressure in sitting or lying; water cushions or air cushions are good in such cases.

The **swelling** of the legs may usually be greatly relieved by the leg movements, relaxing the tissues around Poupart's ligament and around the groin. The tissues around the sciatic nerve should be examined, and any tension relieved. The rotation and elevation of the legs, with every possible easy bending and stretching, give relief which persists for days, sometimes.

The **mental depressions** sometimes present when the lower lobes of the lungs are involved, or when cardiac or gastric complications exist, are hard to handle. More frequent feeding helps; an explanation of the source of the gloom—gastric, especially—helps the patient to exercise self-control. Surroundings are rarely able to give cheer; but every effort should be made to keep him happy as is possible. Forebodings may be hailed as evidence of the nonexistence of tuberculosis in some cases in which the diagnosis is doubtful.

Prognosis. In the early stages the prognosis for complete symptomatic recovery is good. Destroyed tissue is replaced by scar tissue, and since lungs contain several times as much area as is really needful, the patient's life need not be shortened nor made less happy and efficient by his experience. After recovery, the weight should be watched for about five years; if no loss of weight nor other symptoms appear, recovery may be considered complete. He is not immune to later attacks, and should remain in the region of his improved health, and should keep up his rational habits of living.

In the later forms of chronic tuberculosis; in the miliary types, and in cases complicated by other diseases, the prognosis is bad for recovery, but good for relief of symptoms and improved comfort.

Acute Pulmonary Tuberculosis (Acute phthisis; florid phthisis; catarrhal phthisis; caseous pneumonia; galloping consumption). This is an acute type of pulmonary tuberculosis characterized anatomically by inflammation, caseation, and liquefaction of lung substance, and clinically by hectic fever, coughs, night sweats, prostration, dyspnea, and the expectoration of large quantities of sputum which usually contain tubercle bacilli and pyogenic organisms. Two types are recognized; pneumonic and broncho-pneumonic. A subacute form of either type is recognized, which may become chronic.

The pneumonic type simulates croupous pneumonia, but usually affects the upper lobes. The onset is sudden, following a chill with pain in the side, remittent fever, cough with a profuse expectoration, which is soon rusty and purulent, dyspnea, night sweats and rapid emaciation. After a few days the tubercle bacilli and elastic fibers are found in the sputum. There is rapid loss of flesh and strength and the patient succumbs in a few weeks. It may become prolonged and last for months.

Tubercular bronchopneumonia is more frequent than the preceding condition and usually occurs in children following measles and whooping cough. The onset is gradual with hectic fever, rapid

pulse and respiration, severe cough, dyspnea, night sweats with rapid emaciation and prostration.

Both lungs are attacked, especially the upper lobes, and present branching areas of caseation with small ragged cavities. The thorax shows signs of a diffuse bronchitis with increased vocal fremitus and apical dullness upon percussion, with mucous and subcrepitant rales.

Chronic Pulmonary Tuberculosis (Tubercular phthisis; consumption; incipient phthisis; chronic phthisis and chronic ulcerative phthisis). A chronic pulmonary disease characterized anatomically by the ulceration and softening of tubercles situated in the lung tissue inducing a septic infection and clinically by fever, cough, dyspnea, emaciation and exhaustion.

Symptoms. The onset is insidious—is usually attended with gastrointestinal disturbances as anorexia, dyspepsia, epigastric distress after meals, malaise, pallor and secondary anemia and cough. Soon an afternoon temperature is noticeable and a little later night sweats appear; face is flushed, eyes glassy, pupils dilated, cough becomes more severe with free expectoration, progressive emaciation with marked loss of weight and impaired strength, pains in the chest, dyspnea, irritable heart, and diarrhea which may alternate with constipation. Although the emaciation and weakness become profound the patient is hopeful until the end (spes phthisica). The cough, which is one of the first and distressing symptoms, is at first dry and hacking with little expectoration, but later with consolidation is aggravated; the expectoration is mucopurulent and contains the bacilli and elastic fibers. With cavity formation the cough becomes very severe and profuse; the expectoration is purulent, greenish in color and made up of heavy coin-shaped plugs which sink when placed in water (nummular plugs).

Pain when present is due to an associated inflammation of the pleura. Often respiration is increased to thirty or more per minute. Dyspnea is not marked except in the later stages or upon exertion. Hemorrhages may be early or late. The blood may be bright red and frothy or dark and heavy from stagnation. Hemorrhages are caused either by a hyperemia, or more frequently, from an erosion of the blood vessels or rupture of an aneurysm.

The **fever** is quite characteristic. At first there is only a slight elevation in the afternoon, but later with beginning degeneration of the tubercular areas the fever presents a remittent type. With cavity formation it is always intermittent, the highest temperature occurring in the afternoon about four o'clock, with the lowest in the correspondingly early morning hours.

Associated with a decrease in temperature is the sweating which is often excessive, saturating the bed clothes and producing

great exhaustion. Emaciation always occurs in the later stages of the disease and is due to the fever and impaired digestive and assimilative powers. The thorax and extremities are more commonly affected. With cavity formation and hectic fever there occurs a marked leucocytosis which is probably caused by a secondary infection by one of the pyogenic organisms. The gastro-intestinal symptoms are anorexia, constipation, alternating with diarrhea and gastric catarrh. The genito-urinary symptoms are due to a fever and toxemia characterized by decreased elimination and dropsy. Albumin and casts are found in the urine.

Inspection usually shows a long and narrow emaciated chest, ribs depressed and oblique, costal arch very acute; cartilages prominent, sternum depressed, scapulæ winged, clavicles prominent with supra and infra clavicular areas depressed. The interscapular region is immobile and flat. The X-ray gives much more accurate information than ordinary methods of diagnosis. The first areas involved are usually under the sternum.

In the early stages a slight dullness is found over the apices, more commonly on the right. Later with marked consolidation and expansion of the parts the area of dullness is increased and may be elicited above or below the clavicles or between the scapulæ. With cavity formation a tympanitic or cracked-pot note is detected. In the early stages respiration may be inaudible over the affected area. Later the breathing is harsh and expiration is prolonged. Crackling rales are usually detectable and if not present coughing will develop them. The vocal resonance is increased.

Auscultation over cavities may detect cavernous or amorphic breathing with large bubbling and gurgling rales. Bronchophony and pectoriloquy may be present. The irregular fever, cough, pallor, emaciation, hemoptysis, night sweats, signs of consolidation and cavity formation; the presence of bacilli and elastic fibers in the sputum are all characteristic, and these confirm the diagnosis.

Prognosis. This varies with the stage of the disease, but generally it is very unfavorable as the individual dies of exhaustion in about two years. Many cases under the influence of dry, rarified atmosphere, rest, sunshine, good food with fresh green vegetables and light spinal treatment are prolonged indefinitely and often the process is rendered latent. Unfavorable signs are high temperature and rapid pulse, continued gastric and intestinal disturbances and the development of secondary tubercular processes.

Acute Miliary Tuberculosis (Acute phthisis; galloping consumption). This is an acute infectious febrile disease characterized anatomically by the general or local development of miliary tuberculosis, and clinically by the symptoms of an acute infection; this may be generalized (typhoid), pulmonary, or cerebral, according to the locality chiefly infected.

This acute form of tuberculosis occurs more frequently in infants and children than adults and with few exceptions is secondary to an active or latent tubercular process in the lymphatic nodes, bones or lungs. It may follow other infectious diseases as measles, whooping cough, variola or influenza. The bacilli are probably disseminated by the blood.

General or Typhoid Tuberculosis. The onset is gradual with headache, anorexia, malaise, progressive weakness and moderately high, irregular temperature (102° or 104° F.), hurried respiration, rapid and feeble pulse. Cough and sweating may or may not be present. As the disease advances typhoid symptoms develop as brown fissured tongue, muttering delirium, subsultus tendinum, carphologia, but soon the prostration becomes more profound, and cyanosis develops with stupor and coma. Death supervenes within six to eight weeks.

Acute Pulmonary Miliary Tuberculosis. In this form the tubercles are chiefly located within the lung tissue. The onset is usually sudden with a chill and a previous history of cough or chronic phthisis and in children of measles or whooping cough. Respiration is rapid. Dyspnea and cyanosis are marked. Fever is high, 102° to 104°, with pain in the chest and prostration. Sputum is abundant and may be rusty in color. Elastic fibers and tubercle bacilli may be found. Leucocytosis may be marked.

Progressive emaciation and anemia are accompanied by vertigo, headache, sleeplessness, coma and death, which occurs in from four to twelve weeks.

Tubercular Meningitis (Basilar meningitis; acute hydrocephalus) is an acute tubercular inflammation of the pia mater characterized by cerebral irritation and compression, emaciation and death.

This usually occurs in scrofulous children, between two and seven years of age and is almost always secondary to some other tubercular process in the body. The tubercles are found along the blood vessels in the pia mater, usually at the base of the brain as grayish-white, transculent gelatinous granules causing a productive inflammation with consequent thickening and opacity of the membranes. The resulting inflammatory exudate confined to the cranial cavity and the accompanying toxemia produces the symptoms.

The onset is insidious with irritability, anorexia, headache, sleeplessness, constipation, loss of flesh and irregular periods of fever. This lasts from a week to a month and gradually passes into the stage of excitation.

This is characterized by projectile vomiting, severe headaches, convulsions and fever ranging from 98° in the morning to 103° or 104° in the evening with an irregular compressible pulse, retrac-

tion of the head, photophobia, tinnitus aurium, vertigo, contracted pupils, muscular twitching, intolerance to sound with the hydrocephalic cry and cutaneous hyperesthesia. This stage lasts from two weeks to a month and passes into the **stage of depression.**

In this stage all the symptoms of cerebral irritation abate. The vomiting and headache gradually subside. Temperature is less, pupils dilated, pulse slow, irregular and compressible. Respiration irregular and sighing, periodic convulsions, strabismus, carphologia, mental stupor and paralysis are frequent. Collapse finally occurs with Cheyne-Stokes breathing and coma which terminates in death in a day to a week.

Fibroid Phthisis (Chronic interstitial pneumonia; cirrhosis of the lungs; Corrigan's disease). This is a chronic inflammatory condition of the lung, characterized anatomically by an increase in the connective tissue, decrease of the parenchymatous structures and clinically by emaciation, cough and mucopurulent expectoration containing the tubercle bacilli.

Pathology. The disease is caused by the bacilli of tuberculosis, but predisposing is a low-grade inflammatory condition of the supporting structure of the lung causing a fibrosis of the interstitial tissue with pressure atrophy of the alveoli. The common irritants are those which occur in the pursuit of occupation, such as chemistry, stone cutting, grinding, mining. The straining respiratory excursion causes a dilation of the bronchi and bronchiectasis results. The process usually begins in one apex and gradually extends over the whole lung, seldom affecting both sides. The lung is hard and fibrous; the alveoli obliterated. It resists cutting and upon section presents a dry gray, marble appearance and areas of caseation. The unaffected areas are emphysematous and the right ventricle of the heart is always hypertrophied. From the long-continued toxemia amyloid degeneration is found in the abdominal organs.

Diagnosis. The onset is very gradual, characterized by a persistent cough occurring in paroxysms in the morning with a profuse mucopurulent expectoration containing the bacilli. If bronchiectasis is present it may be fetid. This condition may last for years with only slight loss of weight but later irregular fever with night sweats and dyspnea develop. Edema due to failure of the circulation is accompanied by rapid emaciation and eventually death. The course of the disease is from five to twenty years.

X-ray plates indicate the location and extent of the lesions.

Inspection shows a retraction over the affected area due to contraction of the mature connective tissue. Palpation shows lessened respiratory excursion with increased vocal fremitus. Percussion shows a dullness and impaired resonance over the affected region with temporary or impaired resonance of the adjoining emphysematous areas. Auscultation in the early stages shows vesicular breathing with large and small moist rales, but later the breathing is bronchial, broncho cavernous or cavernous with localized gurgling rales.

Scrofula is a mild tubercular inflammation of the lymphatic nodes. It occurs in children and young adults with a weakened constitution which is probably hereditary. Cervical and upper dorsal lesions so alter the circulation to the head and neck structures that the resistance of the lymphatic nodes is lowered and when the tubercle bacilli enter the lymph stream through diseased tonsils or nasopharyngeal membranes they are able to proliferate and produce their characteristic reaction. It occurs more often in the colored than the white race and usually affects the cervical region, but is occasionally found in the bronchial and mesenteric nodes. Rarely it affects all the nodes of the body.

It is first noticed as slight kernels under the angle of the jaw which slowly enlarge until the whole chain causes a marked swelling in the anterior cervical triangle.

The nodes are tender upon manipulation, are solid and move under the skin. Accompanying symptoms are moderate fever, headache, restlessness, anorexia and constipation. Later as suppuration occurs the nodes soften and become adherent to the overlying tissue; these are perforated, allowing a dark colored discharge to escape. The symptoms are always exaggerated during suppuration, but abate as the toxemia is relieved and the process tends to take a chronic course which may last for months or years.

The bronchial lymphatics are often affected; they become hardened and calcified, and are easily recognized by the X-ray during life. These may cause later irritative symptoms, and may lead to an unbased diagnosis of fibroid phthisis.

M. L. Burns reports calcified tubercular bronchial lymphatic nodes found by X-ray examination in patients with local pain and persistent cough, but no other tubercular symptoms.

In such cases correcting the cervical lesions and raising the ribs and sternum, with the establishment of better habits of breathing is usually followed by relief of the symptoms.

Tuberculous laryngitis (Laryngeal phthisis; throat consumption) is an infection of the larynx with the bacillus tuberculosis. It is characterized by ulceration, dysphagia, cough, weakness of voice, hectic fever, and progressive emaciation. It is nearly always secondary to pulmonary tuberculosis.

Huskiness proceeds to a painful whisper. General ill-health; irritable, short, frequent, husky, ineffectual cough; frequently severe pain, increased by swallowing; local dryness and rarely paresthesias are noted. Dsypnea is marked and edema is present. There is sometimes suffocation on swallowing. Irregular fever, night sweats, and other symptoms of pulmonary tuberculosis are usually present.

Examination of the larynx very early shows local anemia. A little later, there are numerous bilateral, pale, round, or pointed

eminences. These become broad, shallow, irregular, ill-defined, slow, painful ulcers with gray bases and raised edges. The vocal cords and epiglottis are infiltrated, thickened, and paralytic, often being destroyed late in the course of the disease. There is local soreness on pressure and often enlarged cervical lymphatic glands.

The sputum is moderately gray, thick, ropy, and mucoid containing the bacillus of tuberculosis.

Treatment includes that of tuberculosis in general, with local treatment to render the patient comfortable. The larynx should not be manipulated either internally or externally. Relaxation of the cervical and upper thoracic tissues is usually required. The use of the voice is forbidden, the patient may whisper a few words at a time.

Tuberculous Peritonitis is usually secondary to infection of the intestine, whether intact or ulcerated. In women, it may originate in the Fallopian tubes. In males it may follow testicular disease.

It may complicate phthisis. It is most common in children, again between the ages of 20 and 40, and may occur at any age.

The symptoms may set in acutely with considerable fever, meteorism, and abdominal pain, or the onset may resemble typhoid fever.

In children, it is most commonly chronic from the start, with fever, gradual enlargement of the abdomen, areas of dullness and resistance, and others of resonant percussion. Sometimes distinctly palpable nodules due to enlarged glands may be palpated; at other times, the sausage-shaped omental tumor is found.

The general symptoms include irregular fever; wasted limbs and thorax; persistent diarrhea which often alternates with constipation; the stools are thin and offensive, and if the large intestine is involved, streaked with mucus and blood. There are moderate colicky pains and tenderness; profuse sweating; and the pleura is sometimes involved.

The local symptoms may be any of the following: Abdominal enlargement with effusion; enlargement with tumor; a combination of both of the above, or enlargement without evidence of fluid or tumor.

There is a moderate reduction of the red cells in some cases; leucocytosis is not constant. The eosinophiles are low in uncomplicated cases.

The diagnosis is difficult in adults but is assisted by evidence of tuberculosis elsewhere in the body. If it is localized in the cecum or appendix, a tumorous mass may develop. The tuberculin tests may be of use in the diagnosis. Most of these have an element of danger.

Treatment. Special attention should be given the lumbar and dorsal spinal regions, that there is no undue muscular contraction, and that there are no spinal or rib mal-adjustments.

Rest in bed is advised, with plenty of fresh air, and an appropriate diet of a highly nutritious nature and rich in fats. If there is much diarrhea, milk alone is indicated. The abdomen must be kept warm by a flannel binder. If the case is obstinate, laparotomy with evacuation of the fluid is sometimes followed by a cure. Exposure of the peritoneum to air and light even for a short time seems beneficial.

Prognosis. This is usually unfavorable. Long and tedious convalescence, with recurrences of the symptoms are usual in cases which recover.

Tuberculous Joints. The joints are affected by blood-borne bacteria. Probably there is usually some traumatic localizing factor. The tubercles set up a chronic inflammation in the synovial membrane, or they may affect the bones themselves, and thence invade the joints.

Pott's disease is tuberculosis of the spinal column. The disease affects the bodies of the vertebræ, thus removing the spinal support. The transverse and laminar parts of the vertebræ are thus allowed to fall together, whence the deformity.

Hip disease is tuberculosis of the hip joint.

"A tuberculous joint should be given absolute rest. That does not mean that you must not treat the patient osteopathically. The patient wants osteopathic treatment all the time, and it does not mean that you must not treat the joint osteopathically, but it does mean that you must not manipulate the joint. I do not mean that the tissues about the joint cannot be very carefully manipulated, if the joint is not disturbed; but I do mean that it is oftentimes injurious and mischievous to manipulate any articulation of the body where there is chronic inflammation due to any infectious agent, tuberculous or otherwise. There is the dividing line between where we should manipulate an inflamed joint and where we should not. Inflamed joints not due to infection in the joint may be manipulated locally and much benefit result. Where we have an inflamed joint, an acute inflammation due to an infectious process (as in a post infectious arthritis following pneumonia), or, in a chronic inflammatory process as in tuberculosis of the joint, and that is nearly always chronic, leave that joint alone; give it rest. Improve the nutrition to the joint and the general nutrition of the patient all you can by giving him fresh air, sunshine, pleasant surroundings, good food and plenty of it, and manipulation of the spine and abdomen. That is the kind of treatment indicated, but have the joint itself absolutely quiet. Fix the limb in such position that the patient will rest and by so doing you will prevent deformity and get quiescence in most cases after several months. When the symptoms of inflammation in the joint subside, gentle manipulation should be instituted to prevent ankylosis."—Geo. M. Laughlin.

"We do not attempt to prevent ankylosis in cases of tuberculosis of the hip. Where the case is taken early we can often restore the joint to good function, but in well-developed cases ankylosis in good position is desirable. Practically in Pott's disease ankylosis in good position gives good results." —Geo. M. Laughlin.

"In all tubercular troubles you have a lowered vitality. If you confine your treatment to the local conditions and neglect the general conditions, and the matter of nutrition, I believe you will make a failure.

"I would give them as nutritious diet as possible, and besides that I would feed them liberally with eggs, milk and cream, provided the digestive organs will stand it, or some form of assimilable fats.

"Then you have the condition of the emunctories to look after. You have the condition of the liver and the spleen, owing to the mal-assimilation which is present in this case. You will have to look to the splanchnics, and so even in the absence of the lesions in that part of the spine throughout the splanchnics, I would thoroughly relax, and I would thoroughly spring that spine, giving as nearly free play of nerve force to the affected part as I could possibly do. That is about all the corrective work that is necessary. In different cases you must use your own judgment."—P. H. Woodall.

Tuberculosis of the pericardium is rarely recognized antemortem. It is practically always with effusion, and the aspirated liquid is blood stained. It is difficult to find the bacilli in the liquid, but inoculation of animals gives, usually, positive results. When the condition is recognizable, death is probably imminent. This is sometimes the cause of death, when patients apparently in an early stage of pulmonary tuberculosis die suddenly.

Tuberculosis of the kidneys is not a very common condition. The diagnosis is suspected when hematuria appears in a tubercular individual. Symptoms of nephritis may appear, and urinalysis show pus, renal epithelium, and bacilli. It is necessary to take great care to avoid confusing smegma bacilli with tubercular bacilli. Accidental contamination of the urine with hay bacilli is also to be avoided.

Since the kidney is only rarely affected primarily, if ever, the lungs should be examined (best by the X-ray) for tubercular foci. X-ray of the kidneys, with or without injection of contrast solutions, may give the diagnosis.

For milder grades and with marked infection of other organs, the systemic treatment of tuberculosis is all that should be done. When one kidney is seriously involved, while the other kidney and the rest of the body are reasonably free from the disease, surgical treatment may be considered.

Tuberculosis of the genital organs and the bladder sometimes occurs. Primary disease of the genitals has been reported but is rare. The treatment is systemic as well as local. Surgery may be indicated.

CHAPTER XLIII

LEPROSY

Leprosy is a chronic specific disease caused by the bacillus lepræ, and characterized by the development of cutaneous tubercles, anesthetic patches or neuritis, and followed by ulceration and destruction of tissue. These forms may coexist in the same person.

Etiology. The exciting cause is the bacillus lepræ. The predisposing causes are use of common drinking vessels, and intimate contact. The modes of infection are probably through inoculation, minute lacerations as scratch marks, use of a common pipe or drinking vessels. The contagion is from open sores, saliva and nasal secretions, and through infected clothing. Several types are recognized.

Tubercular or nodular form. With or without prodromata, reddish or bronzed, erythematous, slightly elevated patches at first hyperesthetic, later anesthetic, appear upon the face, arms, and knees. They fade with the fever, and leave brownish stains or slight hardening. After weeks or months, the attack is repeated, perhaps affecting other areas. These "leprous storms" keep recurring and ultimately raised, somewhat tender, nodules appear on the site of the former eruption. These are pink at first, later becoming a dirty brown tint. These may fade, or may persist until a fresh febrile attack adds to their number. The skin of the face is thickened, the folds deepened, the whole face is broadened, and assumes a "leonine" aspect. Nodules appear upon the limbs, the cornea is attacked, nasal cavities suffer early and severely, fauces, vocal cords, and larynx may be involved. Blindness from the keratitis, ozena, aphonia, cough, hoarseness, and dyspnea occur. The nodules ultimately ulcerate, open sores and cicatrices being seen upon the skin. The constitution suffers from the febrile attacks, weakness first and then prostration; the disease frequently ending in phthisis. The duration is from two to eight years.

Anesthetic leprosy. Prodromata of neuralgic pains, sometimes weakness, and wasting of the fore arm muscles may last for many months. Then pale or light yellowish, itchy, level spots, often symmetrical, appear upon the back and extensor aspects of the limbs, sometimes upon the face, while the corresponding nerve trunks are thickened, nodular, and tender. This stage lasts from two to three years. The patches become anesthetic, cease to

secrete sweat, their surface is white and their edges are serpiginous. Bullæ appear on the limbs and trunk; the fingers are contracted; the phalanges may be amputated by necrosis; perforating ulcers attack the feet with spontaneous amputation of the toes; the ears may also be mutilated. The temperature is subnormal except during the eruption of bullæ. This stage lasts from six to ten years. The third stage is marked by muscular paralysis, the third and seventh nerve being often affected, and by dry or moist gangrene of the extremities. The course is very slow, the patient surviving for twenty or thirty years.

"Locally (in Hawaii) leprosy is not considered a fatal disease, for most of the patients die of something else. * * * Just how the disease is transmitted is not known, but it is assumed to be by contact.

"*Symptoms*—Usually the first symptoms to appear are anesthetic nodules in the skin of the face, arms, or legs. The smaller ones give the sensation of imbedded shot on passing the finger over the skin. They attain also a pea-size. These nodules are filled with bacilli lepræ, and their presence, when anesthetic, is almost diagnostic. This is confirmed by incising them, making a scraping for a slide, staining, and finding bacilli lepræ under the microscope. The bacillus of leprosy is rod or club shaped, similar to, but thicker than, that of tuberculosis; it occurs often in chains, but more often sparsely; yet it has no absolutely regular shape, no constant quality except sluggishness, no constant characteristic except that of being 'acid fast,' and it cannot be cultivated in artificial media nor in animals. In these facts lies the chief difficulty of the leper situation.

"The bacillus has a penchant for soft pendulous areas, the lobes of the ears and the alæ nasi of lepers being usually thickened with them and they are always present in the nasal discharges. A common symptom is leucodermic areas, whitish patches of skin anywhere on the body which become anesthetic; loss of sensation occurs in any region invaded by the bacilli.

"Fingers and toes become enlarged, and distorted by flexion; extremities ulcerate and slough away by erosion. Of all the strange symptoms of this sluggish disease, perhaps the ulcer is the most curious. It presents a clean, raw surface of flesh, yet steadily erodes the tissues until amputated. A foot may become hollowed out by this process from below while from above it looks normal with the exception of being swollen and slightly flexed.

"Constitutional symptoms are, as a rule, not marked, though some cases show a 'leprous fever' early in the disease. Otherwise the cases run along uneventfully for many years, especially if they will take treatment, until, as remarked before, they die of some other disease."—S. D. Barnes.

The bacilli may be found in the blood. The special points are the dusky-red hyperesthetic macules of the early stage and the subsequent development of anesthetic areas.

Treatment. The treatment is eminently unsatisfactory. A few cases of apparently spontaneous recovery are recorded. For single nodules, extirpation is advised. Cleanliness and good hygiene are helpful. Lepers have a contentment which makes it difficult to secure active coöperation in hygiene or therapy. This peculiarity suggests the tubercular hopefulness; in leprosy it is less hope than contented resignation. In either case, lack of interest in therapeutic measures lessens the prospect of efficient or satisfactory treatment.

Prognosis. The prognosis is hopeless as to recovery, but the disease is extraordinarily chronic, lasting for four to thirty years.

Prophylaxis. Segregation should be compulsory in all cases unless the relatives can show that they can make provision for complete isolation and take the proper care of the patient.

A very common and irrational fear of leprosy is responsible for occasional injustice in the treatment of lepers. No doubt this terror is in part due to the religious history of leprosy, and in part due to its rarity in this country. Diseases far more terrible and far more contagious arouse little or no fear, partly because they are common, and partly because there is a tendency to conceal the ravages due to those most to be feared.

Leprosy is feebly contagious, especially in skin lesions. Patients with nasal secretions are most dangerous. In countries where leprosy abounds, leprous men and women have healthy wives and husbands and children, often without transmitting the disease in any form.

Recently successful attempts have been made to inoculate rabbits with leprosy (Stanziale). This may enable such study of the disease as is necessary to better methods of treatment of prophylaxis.

CHAPTER XLIV

TYPHOID AND TYPHUS

TYPHOID FEVER

(Enteric fever; gastric fever; nervous fever; autumnal fever; enteromesenteric fever; typhus abdominalis or abdominal typhus)

Typhoid fever is an acute, specific, infectious, mildly contagious, febrile affection due to the bacillus typhosus and characterized anatomically by hyperplasia and ulceration of Peyer's patches and other lymphoid tissues; and clinically by insidious prodromes, epistaxis, headache, stupor and delirium; diarrhea and tympany; a peculiar rose-colored eruption upon the abdomen appearing in successive crops, rapid prostration, and a prolonged course ending by lysis and a slow convalescence.

Etiology. The exciting cause is the bacillus typhosus of Eberth, found in the lesions, the blood, stools, urine, and sputum of patients. The disease occurs epidemically and sporadically. It is transmitted by the excretions and soiled linen of the patient or of "typhoid carriers," and gains entrance through the alimentary tract by contaminated water, ice, milk, shell-fish, and oysters grown on beds polluted by sewage, uncooked vegetables grown on infected soils and foods contaminated by flies. It is most frequent during late summer and early autumn.

The predisposing causes include lesions of the ninth thoracic to the second or third lumbar vertebræ. Lesions of the cervical region, either vertebral or muscular, and lower rib lesions are to be considered. Lessened mobility of the dorso-lumbar region is constant.

Pathology. Typical typhoid ulcers have the following characteristics: They lie in the longitudinal axis; the edges are thin and undermined; are located in the last three feet of the ileum, and are most numerous near the ileo-colic valve; show a tendency to perforate but do not cause constriction after they have healed. In recovery the ulceration is replaced by granulation tissue, the mucous membrane extends inward over it and the ulcer is healed, leaving a smooth, diffusely pigmented, brownish or slate-colored scar. The gland structure is not regenerated. This stage is usually associated with the fourth week of the fever. The mesenteric glands undergo similar infiltration, enlargement, and softening but seldom rupture or ulcerate. The mucous membranes of the entire body, as well as intestinal tract, undergo catarrhal changes.

Abortive. Convalescence is established within ten days or two weeks after an abrupt onset with marked symptoms. Under proper conditions, this type or the next should be the only form with which we are acquainted. When called after the disease has become well fixed, the more serious cases may be met.

Mild typhoid (typhus levis) is marked by moderate fever, slight diarrhea, and few or no nervous symptoms.

Ambulatory (walking typhoid fever) is a mild type with symptoms so slight as often to be disregarded by the patient. He may come to the physician complaining of dull persistent headache and increasing weakness. This type sometimes terminates fatally by sudden perforation or hemorrhage.

Grave forms include those in which there is sudden onset with pronounced pulmonary, toxic, gastro-intestinal, renal or cerebro-spinal symptoms.

Diagnosis. In the typical case the following symptoms occur: During an incubation period of a few days to two or three weeks, there is an insidious onset with general malaise, vertigo, chilliness, disordered digestion, epistaxis, disturbed sleep, dull occipital headache, depression, and increasing weakness which compel the patient to take to his bed toward the end of the period. The patients are unable to say when the symptoms began. During the first week of the illness the temperature rises to about 103° F. in the evening. The tongue is sticky and moist. Each day the temperature rises slightly above any previous point. The pulse increases daily, and may be dicrotic; the malaise becomes more marked, the patient is listless and has thirst, nausea, and headache. Pressure in the right fossa elicits tenderness and gurgling, and the tongue becomes heavily coated with a white fur. There may be a diarrhea of brownish stools or constipation.

At the end of the first week the temperature in morning is about 103° and evening 104.5° F. Tympanites is marked. The eruption appears upon the upper part of the abdomen, chest and back as five to twenty small, rose-colored spots, raised slightly convex, disappearing upon pressure and at death. These last from three to five days and are succeeded by another crop. They may not appear until the twelfth day and are sometimes absent. During the second week the temperature may rise to 105° F. in evenings with the usual morning remission. All symptoms are exaggerated; there is low delirium. The tongue coating disappears and the tongue resembles raw meat, is fissured, and covered here and there with dry, bloody mucus. Sordes cover the teeth and lips. The spleen reaches its maximum enlargement. The "pea-soup" stools are fluid, offensive, yellow, may be streaked with blood and are from three to fifteen during twenty-four hours. From this time hemorrhage or perforation may be looked for. Stupor and carphologia are grave symptoms. Abortion is liable to occur in pregnant women. During the third week the fever becomes remittent; prostration is extreme; the respirations are shallow and quickened; loss of flesh is noticeable; the diarrhea lessens. All other symptoms begin to show amelioration and convalescence

begins, or the typhoid stage becomes more marked, there is hypostatic congestion of the lungs and death.

During the fourth week the temperature is daily decreasing to normal or subnormal in the morning. The appetite is voracious. The apathy disappears, sleep is more refreshing, delirium is slight or none, the pulse is more full and strong, and the spleen is much smaller.

Convalescence is marked by great debility, emaciation, extreme anemia, severe nervousness, irritability of the heart, profuse night sweats and loss of the hair in women. Bradycardia is frequent. Relapse may occur about the tenth day of convalescence with nearly all the symptoms repeated but less intense than the original. Recrudescences due to excitement or gastrointestinal disturbances are common.

Intestinal hemorrhage is the most frequent and critical of any complication. It is indicated by a sudden decline in temperature to the normal or below, frequently followed by the passage of blood by stool. It is usually due to the erosion of a blood vessel during ulceration, and death may occur.

Perforation may occur in third or fourth weeks. It is indicated by sudden, severe, and localized pain in abdomen, abrupt fall of temperature, tympanites, absence of abdominal respiration, increased hepatic and splenic dullness, hiccough, and signs of peritonitis. Death is probably imminent.

Peritonitis without perforation is not necessarily fatal. Lobar pneumonia, hypostatic congestion of the lungs, and bronchitis are frequent. Nervous symptoms include headache, drowsiness and stupor with great prostration, deafness, impaired or double vision. In the coma vigil, the patient lies perfectly quiet and inattentive with eyes open. He can be aroused but speedily relapses into semiconsciousness.

Phlegmasia alba dolens; acute nephritis; neuritis; jaundice; ulcerations of the larynx, tongue and buccal mucosa; and mixed infection causing anything from boils to meningitis may complicate typhoid fever.

The sequelæ are not frequent. They include the "typhoid spine"; constipation, cholelithiasis, neurasthenia, and general ill-health. Occasionally, paralyses, neuritis, chorea, hyperesthesia, epilepsy, orchitis, edema and gangrene of the uvula, metrorrhagia and well-marked marasmus follow typhoid. Alopecia and transverse markings of the nails are due to the malnutrition. Acute confusional insanity is more frequent after typhoid fever than after any other febrile condition except influenza.

The urine has the usual febrile characteristics. Albumin is variable. Acetone and diacetic acid may be present. Typhoid

bacilli are often demonstrable, Ehrlich's diazo-reaction is present by the third to the tenth day. It may never appear.

If uncomplicated by preëxisting cardiovascular or renal conditions, the blood pressure falls below normal after the patient takes to bed. From the end of the first week a gradual fall in the blood and pulse pressure continues until convalescence is established.

The **blood** is characteristic. A fresh smear may show the large phagocytic cell of Mallory. During the first week there is a slight rise in the number of red cells which slowly falls until a marked anemia is present by the time convalescence is established. Regeneration begins with defervescence. The fall may be accentuated during the fourth week. After hemorrhage, nucleated reds may be found. The hemoglobin runs parallel with the number of red cells but returns to normal more slowly. Blood-platelets and fibrin are reduced. For this reason peritonitic adhesions are not usually serious in typhoid. The white cells are slightly increased at first, the count gradually diminishing to about 5,000 per cmm. A decided rise after a cold bath is not unusual. There is no true leucocytosis in uncomplicated typhoid. Differential count shows polymorphonuclears and eosinophiles diminished, mononuclears and lymphocytes increased. During convalescence there is mild eosinophilia, and degenerated leucocytes, leucocytic shadows and leucocytes with granules of glycogen are to be found. Return to normal blood picture is slow and the blood retains its characteristic features for about three weeks after the temperature is normal.

The Widal reaction is usually positive during the second week. Occasionally it is positive in non-typhoid patients, and occasionally it remains negative during the course of disease presenting typical typhoid course. Repeated tests should be made in doubtful cases.

Hemorrhage causes an acute posthemorrhagic anemia with leucocytosis. Perforation or pyogenic infection is accompanied by a rising leucocyte count.

The stool is copious, watery, fetid, like "pea-soup," in appearance, containing, besides the fecal matters, bacilli of typhoid, blood, shreds of mucous membrane, sloughs, and many triple phosphate crystals. It has an alkaline reaction. A stool frequently tinged with blood is sometimes a warning of coming hemorrhage. When hemorrhage occurs the stool is black, tarry and sticky, and the usual chemical tests for blood are positive.

The data for diagnosis are (1) general from the clinical symptoms, the temperature curve, eruption, peculiar diarrhea, and enlarged spleen, (2) specific by isolation of the typhoid bacillus from the blood, stools, urine and rose-spots, and by the Gruber-Widal reaction.

The disease must be diagnosed from enteritis with an irregular fever, peritonitis, acute miliary tuberculosis, meningitis, appendi-

citis, peritoneal tuberculosis, rightsided salpingitis, simple continued fever, typhus fever, relapsing fever, trichiniasis, and cryptogenetic septicopyemia.

Treatment. When typhoid fever is present in a community, its presence should be suspected in any individual showing the characteristic prodromal symptoms. Treatment inaugurated at this time should consist of thorough correction of any lesions found in the lower thoracic spine and the ribs. The ribs should be raised freely and the usual spinal rigidity be completely removed. Bony lesions anywhere in the body should be corrected. The thorough examination of heart, lungs, liver, spleen, bowels, urine and blood at this time may be very important in governing the later care of the patient and in preventing complications. The Widal test is usually negative until the second week, but the test should be made as soon as possible and should be repeated if negative each week through the course of the disease. It is not possible to make a certain diagnosis of typhoid during the prodromal stage, but many cases presenting the prodromal symptoms and receiving correct treatment never show characteristic symptoms of well-developed typhoid. Whether true typhoid can be aborted or not is a question which cannot possibly be answered by the very circumstances of the case. It is true that patients presenting prodromal symptoms and receiving early and correct treatment rarely, if ever, succumb to the disease.

The long days of serious illness of the ordinary type of typhoid too often cause an unwise demonstration of vigorous therapeutic measures of various kinds. The use of whisky and other alcoholic stimulants or any other drugs is urgently contraindicated. Almost infinitesimal amounts of alcohol may exert serious influences upon a body already weakened by the disease. Even the alcohol inhaled as the result of an alcohol rub is too much for the ordinary patient. The alcohol rub should be superseded by a dry rub with a moderately rough towel and by mild massage. If skin stimulation is urgently desired a pepper solution or mustard water may be used instead of alcohol for rubbing. The collapse that sometimes follows a cooling bath can be avoided by exposing only a small area of the body to the sponge and making the process a very slow one. A sponge bath of water of a body temperature or slightly above reduces the fever through evaporation, but gives little or no shock.

During convalescence treatments for the correction of the "typhoid spine" should be given once to thrice each week. The various accidents of convalescence can be met as they occur.

Diet. Liquids are usually given. Milk, diluted with water or lime water, is an old stand-by. About three pints every day should be given; if curds appear in the feces the milk may be peptonized. Whey, sour milk, buttermilk, broths, albumin water, all are sub-

stitutes, and are given when the patient cannot take sweet milk. Recently a number of new diets have received commendation. These include the "high calory" diet, which includes three pints of milk with one of cream, two to eight ounces of milk-sugar, eggs, butter; sometimes cereals, toast, potato, and other soft foods are given. A full sugar diet, as of candy alone, is based upon the immediate absorption of sugar, its value as a source of energy, and the fact that a plentiful carbohydrate supply lessens the danger of acidosis.

Rectal feeding may be necessary. Three or four times each day the rectum should be gently washed with warm salt solution, or with a weak molasses or sugar enema. After this has been voided the nutrient enema, of 3 or 4 ounces peptonized milk, one-half ounce meat juice, and either the yolks of two eggs or an equivalent amount of other proteid, should be slowly injected. The molasses enema has received much praise; it gives some nutrition, relieves meteorism, and appears to be pleasant in after effects.

The plentiful giving of cool, fresh water in abundance is most helpful. At intervals of twenty minutes a few drops may be allowed to fall upon the tongue, and this will be swallowed without the patient's being disturbed.

"If your judgment will permit you to do so, correct the predisposing spinal lesions at once; thus restoring normal circulation and nutrition to the bowel. Treat other spinal conditions as you find them, giving slow deep treatment, relaxing all contractions full length of the spine, occiput to coccyx. * * * Give gentle stimulative treatment to the spleen, for upon the early activity of this organ in the production of both red and white blood cells depends the speedy restoration of the body tissue. The neck treatment must be soothing, gentle, relaxing, deep, and not of long duration."—Julia E. Foster.

"Gentle treatment twice or three times a day at first usually keeps the fever down and patients always give evidence of its grateful effects. * * * The relaxing of the spinal musculature which always becomes tensed as the fever increases, tends to avoid the congestions of spinal areas and thereby prevents complications and keeps the bodily functions active. The treatment also greatly relaxes the high tension of the patient due to fever and intoxication. It precludes the call for a nerve sedative and frequently induces sleep immediately following. Typhoid makes such pronounced ravages upon the nervous system and osteopathic treatment so essentially combats this effect, that the rapid convalescence of a case brought through under that treatment is in striking contrast to the slow recovery where other means are employed."—P. M. Peck.

"The patient should be seen at least three times a day; in administering treatment he should be rolled over on his side, the attention first being directed to the contracted muscles of the back, the relaxation of which is best accomplished by firm inhibition along the spinal column on each side, and then by gently springing it, which if continued for a little while invariably brings relief.

"In the first stage of the disease or during the first week, severe headache is nearly always present. This can generally be relieved by thorough relaxation of the muscles and ligaments of the neck especially the ligamentum nuchæ. * * * Tympanites is almost always present especially after the second week, and sometimes in such an aggravated form as to render the condition most serious. A good deal of the gas is usually gotten rid of by stimulation over the splanchnics; *very* gentle abdominal manipulation can also be given, but this should be

done very carefully. If those means should fail, a small rectal tube should be used; it should be inserted very carefully and not too high."—T. D. Lockwood.

"Mechanical stimulation of the liver and kidneys is called for, with special attention to treating the ninth to twelfth dorsal vertebrae, which are considered to be the area of the spine most closely connected by nerves with the portion of the small intestine, in which the typhoid germs are most active, and quieting pressure treatment along the spine to relieve the tired restless feeling.

"I have said nothing relating to correcting vertebral lesions in typhoid. Excepting such corrections as will take place when we have relieved the pull of unequally contracted muscles, I believe it best to defer the adjustment of spinal lesions until convalescence. If we attempt such corrections during the febrile stage we will violate our principle of avoiding all strains and the added irritation would be more likely to raise the fever than to lower it. Our treatment of typhoid would be far from complete if we confined our activities to the proceedings already mentioned. Our duty to the public can only be fulfilled by enforcement on our part of all hygienic principles which are of service in preventing the spread of the disease."—R. F. Weeks.

"The first step in the treatment is to confine the patient to bed, regardless of how mild the symptoms seem to be. Correct all lesions affecting both nerve and blood supply to the infected region when it is possible. * * * A severe or rough treatment is contraindicated. If the patient has a high temperature and is excitable the best thing is to get the muscles thoroughly relaxed from the occiput down, giving especial attention to the splanchnic region. By gently stretching the spine and securing motion between each vertebra you will get satisfactory results. * * * The liver and spleen should be given careful attention, see that the gall bladder is thoroughly emptied, as the bile has a beneficial effect on the intestinal tract. The kidneys are to be kept active. It is best to use a saline enema at the first visit to be sure the bowels are thoroughly emptied. Constipation during the course of the disease, that cannot be controlled by the treatment, should be relieved with the saline enemas, it will not be necessary to use them oftener than every second day. If, as is usually the case, a diarrhea is present, the treatment should be inhibitory. The manipulation used requires a great deal of judgment, be careful not to overtreat and at the same time try to get results with each treatment. Unless the patient is critically ill or is having hemorrhages, two treatments a day will be all that is necessary, a few cases will require more than this."—M. J. Carson.

A positive **prognosis** cannot be made. Favorable signs are constipation or slight diarrhea, low temperature and moderate or no delirium. Unfavorable symptoms are: obstinate and severe diarrhea, high temperature appearing early, cardiac exhaustion, marked nervous symptoms with coma vigil or stupor, nephritis, repeated intestinal hemorrhages, and a great reduction in the blood platelets. A steadily falling blood pressure is a sign of great danger. The prognosis is more favorable in the winter than in the summer and in children than in adults. Pregnancy and obesity give a bad prognosis. Complications such as pneumonia, pleurisy, meningitis, otitis, or erysipelas may occur.

Recovery may begin at almost any time. Convalescence is longer the greater the weakness and higher the fever. Under osteopathic care convalescence is less tedious.

Death results from exhaustion, cardiac failure, or some complication, and usually during or about the third week of disease.

Prophylaxis. Public prophylaxis is partially secured by maintaining good drainage, a pure and uncontaminated water supply, and control of flies.

The patient must not be allowed to infect others. Isolation is best. Disinfection of urine, stools, sputum and of all articles which may be accidentally contaminated by these excretions is necessary. For the urine use equal amounts of a 1:20 solution of carbolic acid and urine and let stand for two hours. For the stools, mix with at least twice the amount of carbolic solution and let stand for several hours. Disinfect bath water after using with chloride of lime, one-half pound to a bath of 200 quarts, and let stand for one-half hour before allowing to run into sewer. Sputum should be collected in tuberculosis cups or upon small cloths and burned. Bed and personal linens should be soaked for two hours in the carbolic solution before leaving the room, then sent to the laundry to be boiled. Dishes should be boiled before sending from the room.

The nurse should wear a rubber apron and rubber gloves when convenient, and these sterilized as occasion demands. The room should be thoroughly disinfected after the patient has recovered.

There seems to be no doubt of the existence of **"typhoid carriers,"** whose alimentary or urinary tracts carry the bacilli, but who, for some reason, are not greatly affected thereby. In such carriers, any unclean habit, which results in the presence of even microscopical amounts of their fecal material upon their fingers, renders them a source of considerable danger. The remedy is easy —for each person to be so clean in habit that absolutely no fecal material reaches the fingers; and also that the hands be thoroughly scrubbed with soap and water after every defecation. Surely these are nothing more than reasonably cleanly precautions, yet they are enough to protect against the danger of typhoid carrier —if he only would become educated into the habits. When a typhoid carrier is a cook, and has unclean habits about toilet and hands and food stuff, then the danger is considerable. Only the forces which lie within the normal cells of the normal body are able to combat infections so constantly and so insidiously introduced into the body.

Typhoid, like typhus, should be considered a disgrace to modern civilization. It is a filth disease, absolutely. Its existence would be limited to those now suffering from it, if there were no avenues by means of which the excreta could reach food and drink.

PARATYPHOID FEVER

Paratyphoid fever is an acute infectious disease similar to typhoid fever but of a milder type. It is caused by the paratyphoid bacillus, a form or forms intermediate between the bacillus typho-

sus and the bacillus coli communis. It agglutinates with cultures of its own kind but not with those of the typhoid bacillus.

Pathology. There are no special intestinal lesions as in typhoid. There may be irregular and atypical ulcers in the lower eight or ten centimeters of the ileum but these are not confined to the lymphoid tissue and are not accompanied by enlargement of Peyer's patches or swelling of the mesenteric glands.

Diagnosis. The symptoms in most cases resemble typhoid fever closely but it is of shorter duration, the premonitory symptoms are absent, prostration is early, myalgia is more marked, and the temperature rises more rapidly. In the gastro-intestinal form, the temperature rises rapidly after a chill, and diarrhea supervenes at once. The fever usually terminates by crisis.

Complications are mainly purulent arthritis and myositis.

Diagnosis is by the serum reaction only. Both species of bacteria must be employed in the test. The clinical symptoms of vomiting, epigastric pain, and marked prostration are dominant features. Cultures may be obtained from the blood, urine and feces.

The treatment is the same as for typhoid fever. No doubt many of the "aborted" cases of typhoid, in which the diagnosis rests upon symptoms alone, are really of this fever.

TYPHUS FEVER

(Contagious fever; ship fever; jail fever; camp fever; exanthematous typhus; Brill's disease; petechial typhus; spotted or putrid fever)

Typhus fever is a comparatively rare, acute, specific, epidemic, very highly contagious, febrile disease characterized by sudden invasion, rapid rise in temperature, pains in the head, back, and limbs, the appearance on the fifth day of a macular and petechial eruption, low muttering delirium, a heavy, drunken expression, a musty odor, and a crisis about the fourteenth day.

Etiology. The specific organism is the bacillus typhi-exanthematici (Plotz). The predisposing causes are filth and overcrowding. It is rare in the United States except in seaports. It has appeared in Europe during this war. It is transmitted by contact, fomites, and human body-lice, probably the respiratory secretions, and it is infectious throughout the disease and convalescence. The incubation period is from a few hours to two weeks, usually twelve days, with malaise a day or so before invasion.

Diagnosis. The onset is sudden with chill and pains in back, limbs and head; temperature reaching 104° F. within a few days; pulse frequent, 100 to 140, bounding, often dicrotic; the usual fever symptoms; tongue with a thick white fur later becoming brown; bowels constipated; conjunctivæ injected; pupils contracted, "ferrety eye"; face with a uniform deep, dusky flush and glazed skin,

expression dull, heavy, and apathetic; early prostration; and noisy delirium.

As the disease progresses, the temperature continues to rise; the pulse becomes small and weak; a pungent musty or mousy odor appears; the teeth become covered with sordes, and the prostration is extreme.

Eruption. On the fifth to the seventh day there appears a "mulberry rash" over the whole body except the face. Distinct papular rose-spots which do not disappear on pressure nor after death, appear first upon the abdomen, and constantly increase over the body for forty-eight hours. Some of these may become hemorrhagic. During the second week the typhoid state comes on rapidly with low muttering delirium, ataxic symptoms, subsultus, tremors, carphologia, dilated pupils, and perhaps bronchial symptoms. Coma vigil, retention of urine, paralysis of the sphincters, and death may occur.

About the fourteenth day the patient sinks into a sound sleep, the temperature falls rapidly, there is profuse sweating, a critical diarrhea, and an abundance of urates in the urine, after which the patient gains strength rapidly. The spots pass through gradations in color to branny desquamation.

The duration of the disease is from six to fifteen days. Extremely mild cases may have slight fever, no delirium and convalescence established by the tenth day. **Malignant** or typhus siderans is very severe from the onset and death occurs in two or three days.

The complications may include retention of urine, gangrene of extremities or bed-sores; hypostatic congestion of the lungs, bronchitis and broncho-pneumonia. Parotid bubo and pyemic abscesses, thrombosis of the femoral vein, meningitis and nephritis are rare.

The heart shows the effects of the poison early. An abnormally slow pulse (50 to 30) is a bad sign. The spleen is enlarged but not tender. The urine has the usual febrile characteristics. The blood changes are not characteristic.

Treatment. Isolation and disinfection of clothing and excreta are imperative. Put the patient to bed, in the open air if possible. An experienced nurse should be constantly present.

The position of the patient should be changed from time to time to prevent hypostatic congestion. Adjustment of the entire spine from occiput to coccyx is necessary, paying particular attention to the relationships between head and atlas and neck and inferior maxillary. Stimulating treatment along the spine and to the heart may be indicated.

No solid food is permitted. Liquids should be used as plentifully as the assimilative powers will admit. Milk, milk and soda water, broths, and albumin water may be used.

The **Prognosis** depends upon age, temperature, frequency of pulse, early stupor and severity of symptoms. Mortality of the young is slight, in those past middle life it is high. Death occurs during the second week from toxemia; during the third mainly from pneumonia. Second attacks are very rare.

Prophylaxis. Keep the community in a hygienic condition, prevent overcrowding, and look to the condition of immigrants. The existence of typhus fever in any city, or camp, or in any other place, as an epidemic, is a disgrace. Only a most inexcusable lack of attention to the simplest laws of hygiene permits the continued existence of this disease. Sporadic cases may, and no doubt do, occur, in the absence of serious neglect of sanitary precautions; this is especially true of seaport towns, and of places where the populations are frequently changing. But the typhus epidemic has no place in a civilized community.

CHAPTER XLV

INFLUENZA, PERTUSSIS AND DIPHTHERIA

INFLUENZA

(La grippe; grip; contagious catarrh; epidemic or catarrhal fever)

An acute, specific, infectious, highly contagious disease, occurring sporadically, epidemically, and pandemically, characterized by fever, by protean symptoms affecting mainly the respiratory, digestive and nervous systems, by muscular pains, and by a prolonged prostration out of all proportion to the intensity of the fever.

Etiology. It is caused by the bacillus influenza of Pfeiffer, present in the nasal and bronchial secretions. The bacilli persist after the severe symptoms have subsided. It attacks oftenest adults between the ages of twenty and forty. One attack seems to predispose to subsequent attacks. Lowered vitality from poor food, fatigue, exposure, old age, bad sanitation, or bony or muscular lesions anywhere in the body are predisposing factors. Lesions involving the midthoracic region are almost invariable. The incubation period is from one to six days, oftener three to four.

Diagnosis. The onset is sudden, marked by chill, temperature which rises abruptly to 102° to 104° F.; quick compressible pulse; sneezing; injected, watery eyes; severe frontal headache and backache; coryza and catarrh of the upper air passages; and marked weakness. In mild cases, defervescence occurs by lysis or crisis; sometimes a secondary rise occurs from the third to seventh day; the depression and debility following is out of all proportion to the fever and persists for a considerable time.

In the severer cases, after the first few days the symptoms may group themselves so that an attack may be said to be of a respiratory, gastro-intestinal, nervous or febrile type according to the predominating organs attacked; or one group of symptoms may quickly merge into another.

The **respiratory type** is marked by paroxysmal, violent cough, after which bronchitis or broncho or croupous pneumonia may develop. The pneumonias are especially apt to develop in the elderly or in infants and are often fatal.

The **gastro-intestinal type** is ushered in by nausea and vomiting, anorexia, epigastric pain, profuse diarrhea, prostration amounting to collapse, and sometimes jaundice and enlargement of the spleen.

In the **nervous type** the initial pains are more severe, there may be delirium, and after defervescence the heart becomes slow

or irregular, with sometimes anginoid pain. Great depression and insomnia follow. Meningitis or encephalitis may be found post-mortem.

In the **febrile type** there is continued fever with delirium, dry, brown tongue and other symptoms of the typhoid state.

The **complications** form a long list: any form of nervous disorder as epilepsy, myelitis or degeneration of the cord, neuritis, neuralgia, insanity; acute otitis media; conjunctivitis; functional or organic cardiac disorders; pneumonias of various types and pleurisy; nephritis; arthritic pains; and cutaneous rashes.

The **sequelæ** are also numerous, the most common being phthisis, chronic gastro-intestinal catarrh, lymphatic enlargement, persistent headache, neuralgia, insomnia, neuritis, neurasthenia, melancholia, mania, and confusional insanity.

The history of a previous attack or the presence of an epidemic are leading factors in diagnosis.

The **spinal examination** shows an extremely contracted musculature with bony or other lesions anywhere from occiput to coccyx. The region in the neighborhood of the fourth thoracic spines, following around to the third, fourth and fifth ribs, is practically always subject to hypersensitiveness and pronounced muscular tension, both of the spinal and the intercostal muscles.

The **sputum** is greenish yellow with coin-like lumps, scanty at first, profuse and purulent later.

The bacillus influenza, a slender rod staining readily with ordinary aniline dyes and growing only on blood streaked serum, is found in the moist respiratory secretions, less commonly in the lung, heart, or central nervous system but rarely in blood. The contagion is carried by the moist nasal and bronchial secretions. The blood and urine show few changes.

Treatment. Rest in bed is imperative even in mild cases and should be continued for a day or two after the temperature is normal to avoid any risk of relapse or complications. The sputum and nasal secretions must be disinfected. The manipulative treatment varies with the symptom-group predominating. Careful relaxation of the tense muscles along the entire spine, very careful correction of any bony lesions, inhibition of the posterior cervical areas to control the fever are some necessary factors. Stretching with internal and external rotation of the legs gives relief.

At the inception a thorough sweat and enema are beneficial. For the rhinitis, the treatment given under this subject should be employed. Gastro-intestinal symptoms may be met with the treatment given under acute gastritis; cardiac symptoms should receive the treatment given under acute endocarditis.

The **diet** should be liquid during the height of the fever, then semisolid with plenty of water. Cooling drinks are good during

the attack. During convalescence, the food should be plenty and nutritious. If the temperature is high, tepid sponging and the ice-cap to the head are indicated. If constipated at the onset, give enema. Frequent inhalations of steam may relieve the naso-pharyngeal and bronchial symptoms. Hot fomentations to the back aid in relieving the distress. If diarrhea is present use the hot fomentations to the abdomen also. The patient must be protected from changes of the weather, especially those at either extremes of life or those having chronic disease. During convalescence, great care must be given to avoid relapse or sequelæ. Rest, nutritive diet, and change of air is advisable.

Prognosis. In uncomplicated cases the prognosis is good for recovery except in the elderly and in infants. Relapses are common.

Prophylaxis. This is best secured by isolation of the patient and disinfection of the bodily discharges. It is not quarantined. Persons suffering from influenza should avoid crowds, and they should not come into close contact with other persons. Certainly kissing should be tabooed at this time. It is particularly desirable that children should be protected from infection. The person who suffers from influenza is also particularly liable to contract certain other diseases, notably tuberculosis and pneumonia; so, for his own sake as well as for the sake of those who might suffer through him, he should very carefully avoid mixing with his fellows during the attack.

WHOOPING COUGH

(Pertussis; tussis convulsiva)

Whooping cough is a specific, epidemic, infectious, contagious disease affecting the respiratory organs and attended by a peculiar paroxysmal cough known as the whoop.

Pertussis is highly contagious, being carried by direct contact and by fomites, attacking principally children between the first and second dentitions. The Bordet and Gengou bacillus is the specific cause. This is found in the sputum most abundantly during the first week, the most infectious period, and becomes gradually less. One attack usually confers immunity. The incubation period is from seven to ten days. The patient may be considered noninfectious five weeks after the first whoop.

Lesions of the cervical and upper dorsal vertebræ and of the first, second and third ribs, affecting the vagi, the phrenic, the sympathetic, the recurrent laryngeal or the vasomotor nerves predispose to the disease.

Diagnosis. Three stages of the disease are usually recognized.

Catarrhal. The invasion is either insidious or well-marked with an initial temperature of 100° to 102° F., attended by symptoms of ordinary naso-laryngo-bronchial catarrh and a loose cough of an incessant character. After one or two weeks, instead of improving, the cough becomes worse and the second stage appears.

Spasmodic. The cough becomes paroxysmal, consisting of a succession of fifteen or more short, rapid, expiratory puffs with no intervening inspiration, immediately followed by a deep, loud inspiration. This is the characteristic whoop and is due to the partial closure of the glottis. Each paroxysm is composed of three or more such spells, the last one followed by the expectoration of a small plug of mucus or by vomiting. During the paroxysm the facies presents a swollen, dusky appearance, eyeballs protruding, reddened eyes, and puffy pinkish lids. The body is bent forward, and the patient is perfectly helpless. Urine and feces may be passed involuntarily. Cyanosis may occur from the strain. The child knows the attack is coming by a sensation of tickling in the larynx, tries in every way to stop it and runs frightened to its nurse or some object for support.

Emotion, irritation of the throat by dust or a tongue depressor, even swallowing, and especially accumulations of mucus in the larynx provoke an attack. Between paroxysms the child is apparently well. If vomiting frequently occurs he becomes anemic and wasted.

During the severe cough petechiæ of the forehead, ecchymosis of the conjunctivæ, epistaxis, bleeding from the external auditory meatus or from the frenum of the tongue and occasionally hemoptysis may occur. Ulcer of the frenum of the tongue is common. The number of paroxysms varies from four to eighty or more in twenty-four hours. This stage lasts three to six weeks, usually about four weeks.

Terminal. The paroxysms occur at longer intervals, are of shorter duration and of less intensity, the catarrhal symptoms are more marked, the expectoration becomes thinner, fluid, mucopurulent, and looser. This state lasts from a week to several months. "Habit cough" may follow.

Convalescence varies greatly, is generally slow and the patients are particularly liable to tuberculosis at this time.

The most common complications are: convulsions in infants, cerebral hemorrhage, broncho-pneumonia, acute dilatation of the right ventricle, tuberculosis and emphysema. The disease may result in cardiac valvular lesions, hernia, or pigeon-shaped chest from the strain. Chronic bronchitis and asthma may follow.

The blood shows an early leucocytosis ranging from 20,000 to 40,000 cells per cubic millimeter, lymphocytes being 35 to 55%; polynuclear cells relatively decreased; eosinophiles, normal or

diminished. The hemoglobin and red cells bear no direct relation to the leucocytosis.

The urine has a high specific gravity, 1022 to 1023; is light yellow; contains much uric acid; and may contain albumin and sugar as a result of the physical strain.

The diagnosis is made by the characteristic whoop in the second stage. If no real whoop is present, the swollen face and eyes, the ulcer of the frenum of the tongue and the vomiting after the severe cough leave no doubt.

Treatment. Isolation of the patient in a well-ventilated, sunny room where he can secure fresh air day and night is essential. Children exposed to infection should be disinfected and isolated for at least three weeks as the disease cannot be diagnosed in the catarrhal stage. If at all severe, rest in bed is advised.

If the physician sees the patient early he may abort the disease. Treatment of the whole respiratory tract with correction of vertebral and rib lesions and relaxation of any contracted muscles should be given. A subluxated atlas and axis are especially harmful. Dr. Still considers the diaphragm a factor in the spasm and treats it as well as the phrenic nerve to give relief. Subluxations of the first and second ribs produce irritation of the recurrent laryngeal nerve and hence of the whole larynx.

"Children who play and sleep out of doors get along better. For the paroxysms I use an elastic belt, with a pad over the stomach. Sometimes the children realize its comfort and refuse to have it taken off. Steam inhalations may give relief; sprays I find useless. A spoonful of syrup made of sugar with lemon or pineapple may be given at the first tickling sensation." —Asa Willard.

The diet must be nutritious and easily digested. The child should be warmly clad and protected from drafts of air. The excretory systems are kept in active condition by plenty of water and diet. Treat the various symptoms as they occur. Relieve the respiration by raising the upper ribs especially those over the heart. Treatment throughout the vasomotor area is indicated.

Inhalations of steam may be beneficial. During convalescence, the child must be carefully watched and fed as broncho-pneumonia or tuberculosis is apt to develop. Change of air is often of benefit. Tonic treatment to assist in restoring the respiratory equilibrium and to increase the nutrition of the child is urgently demanded.

Prognosis. With the complications, this is the most fatal of the acute infections under five years of age. Infants and young children should receive especial care.

Ordinary uncomplicated cases are favorable for recovery. The prognosis depends upon the age and strength of the patient, the severity and number of paroxysms, and the presence or absence of complications. No recurrence is to be expected.

Death is due to spasm of the glottis or to extensive subdural hemorrhage, occurring chiefly in the children of the poor and in delicate infants.

Sequelæ are rather frequent especially in the poorly nourished. Careful watchfulness on the part of the physician and the nurse will do much to prevent these results if treated when the slightest symptoms of overstrain are first noticed.

Prophylaxis. This consists in isolation, disinfection of sputum and final fumigation of the premises. It is not quarantined. Children should be protected from danger of infection, by keeping them away from cases of whooping cough, and also by having their general health kept up by sane and wholesome living throughout childhood.

DIPHTHERIA

(Putrid sore throat; malignant ulcerous sore throat; malignant quinsy; membranous angina)

Diphtheria is an acute, specific, infectious, epidemic and sporadic, contagious constitutional disease occurring chiefly among children, and associated with grave throat symptoms, general symptoms of fever, glandular enlargement, and great prostration, and the formation of a false membrane or fibrinous exudation on mucous and abraded surfaces and often followed by paralyses in various situations.

Etiology. The exciting cause is the bacillus diphtheriæ of Klebs and Loeffler which produces a toxalbumin the absorption of which produces the symptoms of the disease. It is associated with other organisms the most important of which is the streptococcus pyogenes.

The predisposing factors are childhood, ages from two to ten years; naso-pharyngeal catarrh; individual susceptibility; and structural perversions of the neck, clavicle, upper ribs and vertebræ. Muscular contractions of the scaleni and the large neck muscles disturb the relations of the first rib with the clavicle and the vertebræ, thus interfering with the size of the thoracic inlet and the relations of the contained important structures. First rib subluxations are nearly always found. The bacteria are found in the exudation and secretion of the fauces and the saliva.

The usual modes of infection are from one person to another by contact or by infected articles. (The bacillus may retain vitality for months.) Diphtheria carriers are persons who present no recognizable signs of the disease yet carry the bacillus in their throats. They may spread the disease widely. Milk, and rarely other foods, may carry the bacilli. Accidental infection from culture or through animals is rare. The incubation period is from one to five days.

Diagnosis. The bacilli are cultured from the throat, and these, with the characteristic symptoms, are necessary to diagnosis. The **pharyngeal** is the most common type. The invasion may be mild with general malaise and rigors succeeded by a moderate fever, 100° to 103° F., usually falling on the second to third day; pulse full and strong, 100 to 120; anorexia; stiffness of neck, tenderness and swelling of the deep faucial glands at the angles of the jaw; a slight soreness of the throat, and a complaint of a frequent desire to hawk in order to clear the throat. On inspection, the fauces and the pharyngeal mucous membranes are found red, swollen, and with a characteristic glazed appearance. This is soon followed by whitish patches which rapidly coalesce into a dirty white membrane upon the fauces or tonsil, the removal of which exposes a raw bleeding surface. Both tonsils and the uvula may be greatly swollen and spotted with exudate.

By the third day, the false membrane covers the tonsil, pillars of the fauces, and perhaps the uvula which is thick and edematous. The growth ceases after this or the fourth day. The tongue is slightly coated, sometimes with more or less exudate upon it. The bowels are regular or diarrheic. Prostration is marked. After the seventh day, the throat clears, and convalescence begins unless complications intervene.

Atypical forms are many. They are a grave danger to the community by remaining undetected and thus spreading the malady. The Klebs-Loeffler bacillus may be cultivated from the throat. No local membrane may appear, a simple catarrhal angina with a croupy cough being the only symptoms. In other cases the tonsils are covered with a pultaceous exudate but not a consistent membrane. Some cases present only symptoms of a typical lacunar tonsilitis.

"Latent diphtheria" occurs chiefly in hospital practice in young persons subject to wasting diseases. It is manifested by fever, naso-pharyngeal catarrh and gastro-intestinal disturbances.

Nasal diphtheria is usually secondary to the pharyngeal. The main symptoms are bloody, offensive discharge from the nose, attacks of epistaxis, a nasal twang to the voice, and regurgitation of food and drink through the nose. The constitutional reaction is marked. The membrane may or may not be visible.

Laryngeal diphtheria (membranous croup). Extension to the larynx is indicated by hoarseness or loss of voice, a brassy, croupy cough, noisy and stridulous breathing, obstructive dyspnea, and cyanosis. The membrane may appear first in the larynx.

The **bronchial** form has all the symptoms of a severe capillary bronchitis. The membranes after reaching the bifurcation speedily become purulent.

Malignant form. The symptoms are all severe from the start. There is marked prostration, a marked tendency to hemorrhages, and the typhoid state develops early with death in a few days.

Complications are many. Nephritis is the most common. Albuminuria is nearly always present and when associated with blood and epithelial casts and scanty urine indicates parenchymatous changes of the kidney. Uremia may develop without the presence of severe throat symptoms.

Diffuse erythema is common. Occasionally urticaria and purpura are seen. Membrane formation upon external wounds sometimes occurs. Severe ulceration of the throat may follow careless treatment.

Cardiac disturbances are constant. A murmur is heard in 94% of cases. Rapid action with gallop rhythm and epigastric pain and tenderness are serious symptoms. Fatal dilatation may occur as late as the sixth or seventh week. Cardiac diseases, especially myocarditis, are most common during the second and third week.

Capillary bronchitis and broncho-pneumonia are frequently found in fatal cases. Otitis media occurs by extension through the Eustachian tube. Conjunctival diphtheria is rare. It may occur in the physician or nurse from receiving expectorations in the eye while examining the throat of the patient. Meningitis, thrombosis, and septicemia are rare.

The sequelæ may be serious. Post-diphtheritic paralysis is due to a toxic neuritis and is the most common sequela, being present in 10% to 30% of cases. It may appear at the end of the first week but usually within three weeks of apparent recovery. It seems to be more frequent when antitoxin is used, and may appear without diphtheritic symptoms, from preventive doses.

Anesthesia of the pharyngeal mucosa with paralysis of the pharyngeal muscles and soft palate may seriously interfere with deglutition and impair the voice.

Loss of accommodation of the eye causes squint or diplopia. Anemia and chronic naso-pharyngeal catarrh may follow even mild attacks.

The blood pressure is subnormal during invasion, bearing a direct relation to the severity of the faucial attack. Albuminuria does not cause a rise in pressure. Steady progressive fall in pressure is often present in fatal cases.

The **urine** is febrile. Albumin is present early. Often tube casts and renal epithelium can be found. Bacilli are present only when the diphtheritic lesions are so situated as to communicate with the urinary tract.

Blood. Hypercythemia is frequent. It may reach 7,500,000 cells. With the drop in count, nucleated reds and polychromat-

ophilic cells are seen. During convalescence there is a more or less severe anemia depending upon the severity of the toxemia. Specific gravity is increased. Hemoglobin is slightly reduced. Leucocytosis is proportionate to the severity of the disease, usually between 15,000 and 30,000 cells.

The polymorphonuclear cells are increased, there may be a relative or actual lymphocytosis, and the eosinophiles are normal or decreased. Myelocytes are present, 3% to 16%, over 3% being of grave prognostic omen. There may be an acidophilic tendency. Leucocytic shadows are common.

Treatment. The present antitoxin method of treatment is much less dangerous than the older medical methods. It may even be advantageous in malignant cases. Its value diminishes steadily with the course of the disease. In order to prevent disaster due to the use of horse serum and to anaphylaxis, if antitoxin is to be given, an extremely small dose should be given, and the patient watched for two hours or more; if serious effects are produced, no further attempt should be made to use the serum. If no ill effects are noted, a large dose should be given, and this should be sufficient. At any time greater than ten days after antitoxin or any other preparation of horse serum has been injected, there is a probability of sensitization, and no more serum should be injected, except with very careful precaution.

"The treatment of diphtheria by osteopathic methods is often a pleasure rather than a trial because of the success which rewards us for our efforts.

"There has been considerable discussion by the members of our profession regarding the methods to be employed in successfully overcoming this disease, and many have expressed the view that since antitoxic serum is a physiological remedy, which naturally belongs to all schools of healing, it should be employed by the osteopathic physician in cases of diphtheria. I have no objection to the use of serum therapy by those members of the profession who conscientiously feel that they need it in their practice to secure the highest measure of success. However, I feel, on the other hand, that, if they were well acquainted with the technic of the methods which will be given below, they would not feel it to their advantage, from the standpoint of success, to use serum injections in a single case.

"The important measures illustrating this technic, from the writer's standpoint in a case of diphtheria are: First, remove any influences which are interfering with good circulation and nerve control in the region of the throat, and throughout the neck generally, by properly directed adjustive manipulation. Furthermore, promote the best possible circulation in the gastro-intestinal tract, in the liver, in the kidneys, and to the whole vascular system. Second, cleanse the large intestines with enemata, and if there is material in the stomach at the beginning of the illness, wash out the stomach with the stomach tube. Each day thereafter use an enema as a routine procedure. Third, stop all food and give **nothing but water.** Let the patient have all the water desired, either hot or cool. The food is not to be resumed until the disease is fully under control, indicated by the return of the temperature to the normal and the disappearance of all active symptoms of the disease. Fourth, the temperature is controlled by the manipulation and by hydrotherapy, using the full tub bath if necessary. At all times the feet should be kept warm and artificial heat should be supplied to the feet and legs when necessary, even if

the temperature, by the mouth, is somewhat above normal. Ice may be used over the throat while the temperature is high, and may be replaced by hot applications when the temperature has fallen below 103 degrees Fahrenheit. Sixth, the osteopathic physician should resort to intubation in those cases which come under his care after the case is quite advanced and the membranes cause an extreme interference with respiration. The introduction of an O'Dwyer tube into the larynx is not a difficult procedure, and used in those severe cases which, on account of the unfavorable constitutional condition of the patient and the rapidity with which the disease may progress under such circumstances, may develop distressing obstruction to the breathing before the remedial agents which have been mentioned above could control the situation, the results would be highly gratifying. I feel that, if we fully understood and practiced the treatment of diphtheria on the basis outlined above, our results would be exceedingly satisfactory, and we would never feel it necessary to resort to antitoxin at any stage of the disease. In fact, I am convinced that any case which can be cured by antitoxic serum can be cured—and that more quickly and satisfactorily—by the above technic."—R. D. Emery.

The heart action must be carefully watched. Each day pay particular attention to the upper dorsal vertebræ and ribs. Clavicles, ribs, and sternum must be in proper relationship. The occipito-atlantoid articulation, the hyoid, and the inferior maxillary must be watched daily.

"Search out the contracted muscles and the cause of their contraction. Examine and know the condition of the kidneys and bladder. Know that the ureters are freed from all obstructions by pressure or otherwise and are carrying out their normal functions."—A. T. Still.

For the pain around the throat, careful treatment of the cervical muscles and the glands, and hot applications to the angle of the jaw are a comfort. In the laryngeal form, inhalations of hot water vapor with ice pellets to suck afford relief. If suffocation is threatening, intubation or tracheotomy may be necessary.

The mouth must be washed with Dobell's solution or normal salt solution every hour to keep the mouth and pharynx as clean as possible.

Nasal cleansing is especially necessary in the nasal form. Normal salt solution (1 teaspoonful to the pint of water), saturated boric acid solution, or Dobell's are used.

Convalescence requires nourishing foods, fresh air and stimulating treatment.

Prognosis. The prognosis is always guarded, more so in children than in adults. It is usually proportionate to the severity of the symptoms. Favorable indications are moderate fever, only slightly impaired strength, good constitution, and moderate exudate, plus early and vigorous treatment.

Unfavorable signs are high fever, great depression, spreading exudate, great swelling of the cervical glands, large amounts of albumin in the urine, extension to the larynx or nasal mucous membranes, hemorrhages from the fauces and nose, and the general epidemic character.

Death results from involvement of the larynx, sudden heart failure, diphtheritic paralysis, septic infection, occasionally from uremia, or broncho-pneumonia during convalescence.

Prophylaxis. Isolation of the patient should be absolute. All bed and personal linen should be sterilized by boiling. Instruments, tongue depressors, spoons, etc., should be boiled immediately after use or kept immersed in carbolic acid solution. The room after the patient leaves is disinfected.

Careful scrutiny of milder cases of sore throat during epidemics will assist in controlling its spread. Strict surveillance during convalescence is also necessary for the same purpose. After convalescence is established, the patient should be washed with soap and water, then with 50% alcohol (carbolic acid solution 2%, or bichloride of mercury 1:10,000) for three successive days. The hair should be similarly treated or cut off. After death from diphtheria, the body should be wrapped in a sheet which has been soaked in 1:3,000 solution of bichloride of mercury and placed in a closely sealed coffin. The funeral should be private.

Quarantine. The period of quarantine is continued until two cultures taken on different days are negative.

CHAPTER XLVI

DISEASES DUE TO COCCUS INFECTION

LOBAR PNEUMONIA

(Lung fever; croupous pneumonia or pneumonitis; fibrinous pneumonia; specific pneumonitis)

This is an acute infectious disease, variably contagious, due to infection by the micrococcus lanceolatus, and characterized chiefly by pulmonary symptoms of great severity.

Etiology. The specific organism is almost omnipresent in the mouth and in dust. It grows actively only when the tissue-resistance is lowered. The etiology of the disease is practically the etiology of lowered immunity in general, plus some factors due to the peculiarity of the organism. While atypical pneumonias may be due to other infectious agents, such as the typhoid bacillus, or pyogenic organisms, these usually present varying symptoms referable to the nature of the invading agent. These organisms gain entrance into the lung tissue through respiration. Since they are so widely distributed in persons who do not succumb to the infection, it is evident that the disease cannot be considered very contagious, though epidemics sometimes appear to be due to organisms of unusual virulence, and in these an increased contagiousness often appears.

The disease is most frequent in the late winter and early spring; it may or may not appear to be the result of an ordinary "cold" or influenza; these diseases doubtless lower the immunity both in general and in specific relation to pulmonary infections. It very often gives death to the senile and the physically defective; mental defectives frequently die from pneumonia in youth. Heart lesions, diabetes, carcinoma, nephritis, anemia, tuberculosis, all predispose to pneumonia, and long suffering is often mercifully prevented by the disease, truly named "friend" of those who are unfit or unable to maintain comfortable existence in the world.

Bony lesions are widespread, as is to be expected from what has been said of other etiological factors. Rigidity of the mid-thoracic region is the most frequent finding in uncomplicated cases. Other lesions include those of the cervical region, and of the ribs and clavicles. Innominate lesions are also reported as causative; this is probably due to the effects produced upon upper spinal relations through the imbalance caused by the innominate lesions; or to the lowering of resistance through the directly irritating nervous effects of the lesion.

Pathology. The structural changes follow well-marked stages, and these are of vital importance in diagnosis, treatment, and prognosis. The first stage is that of hyperemia, followed by engorgement. The second stage is that of red hepatization, in which the alveoli are filled with red blood cells. The third stage of gray hepatization is due to the partial digestion of the red blood cells, and infiltration of the mass with white cells. The fourth stage is that of resolution, in which the blood is being digested and absorbed, and recovery occurs. The treatment and symptoms vary during these stages, and each must be considered independently.

First stage: **Hyperemia** and **engorgement.** The onset may be very acute; in elderly or poorly nourished persons the reaction may be less pronounced. The changes in the lung begin with acute hyperemia, due to the presence of the infectious agent, with the other etiological factors already mentioned. The fever rises, and there is some dyspnea. The hyperemia increases; the lungs become very seriously congested and a few white cells, followed by many red cells, begin the engorgement, the filling of the alveoli with blood occurs by diapedesis; few or no rhexin hemorrhages occur in typical cases. The filling of the alveoli is associated with great dyspnea and coughing. During the first few hours the cough is hard and dry, perhaps absent; as the engorgement and the inflammation progress the cough becomes looser, often with streaks of blood. Intense pain is associated with the coughing, especially if the pleura is involved.

During hyperemia and early engorgement, the lung sounds are not materially changed. Rales may be heard, variously, according to the area involved. Percussion notes are normal or slightly tympanic. Dullness may begin, and progress slightly during the later stage of engorgement. The urine is of the ordinary febrile type, varying according to height of the fever. The blood shows marked and early leucocytosis; slight leucocytosis, leucopenia, or normal counts indicate either a very mildly virulent infection, or very diminished resistance on the part of the patient. The polymorphonuclear neutrophiles are unusually high, in typical cases. During this stage, the increase is in the younger forms—the finely granular and mononuclear forms. When the infection is severe and the resistance low, the few polymorphonuclears show ragged outlines, very irregular and sometimes extruded nuclei, atypical forms and granules, and many masses of naked nuclear matter are found, all indicating the effects of virulent toxin upon blood of poor resisting qualities. The systemic blood pressure is low, in early hyperemia, increasing during the increase in the fever, in typical cases. Suddenly dropping arterial pressure indicates failing heart, and is a sign of great danger in early cases.

The **treatment** during this time must include thorough and frequent relaxation of the interscapular region and the lower thoracic region; increased mobility of the entire cervical and thoracic region; if possible, correction of the bony lesions as found on

examination. The colon usually contains an increased amount of fecal matter—this must be removed, preferably by enema of warm water, carefully given. Any of the usual solutions may be employed, provided that no irritation results. The patient must be placed in a pleasant, well-ventilated room—the ventilation is the most important thing. The windows must be opened widely, day and night, unless the weather is unusually inclement. Fresh air is absolutely the most important thing, after the structural corrections, in the treatment of pneumonia. Warmth may be provided by blankets, not too heavy, hot water bottles, irons, or salt bags. The thorax may be wrapped in cotton during the stage of engorgement, and until recovery; this is not advised in all cases. Usually no food is asked; none but liquids should be given in typical cases. These may include hot milk, vegetable broths, fruit juices, ice cream, according to the season and the patient's desires. Plenty of cool fresh water should be freely given during all stages. Steady pressure in the suboccipital triangles, or at the sides of the ninth to the eleventh thoracic spines, lowers the blood pressure, diminishes the cough, and lowers the temperature. Sponge baths of water at body temperature lower the temperature and give much relief. Some cases can be aborted during this stage, and recovery be speedy.

"In all pneumonia cases I make use of a hygroscopic clay poultice (such as antiphlogistine) from the very start. This assists greatly in relieving congestion in the lungs by withdrawing serum through the skin and is so specific in its action that the area of inflammation may be *outlined quite precisely* by noting the semi-liquified area of the poultice. These poultices should be changed at least every twelve hours. Every eight hours is better if the physical condition of the patient permits."—F. A. Cave.

Stage of Hepatization. This includes the second and third stages, of red and of gray hepatization, of the older authors. The blood which fills the alveoli, during the stage of engorgement, coagulates. If the lung is cut, the section resembles liver, whence the name. A piece of such a lung sinks readily in water. Percussion elicits a dull note over the affected area. The lung sounds are absent over this lobe, and the rest of the lung gives rales and sometimes tympanic notes. The fever is very high, sometimes to 106° F., delirium may be present; the cough is looser, very painful, and productive of sputum, usually profuse, and of a rusty appearance. The color is due to the partly digested blood, with its hemoglobin transformed partly into methemoglobin.

Engorgement, red and gray hepatization may be present in different parts of the lung at the same time. The course of events is not materially modified by this fact. When the lungs are partly filled with coagulated blood, the clinical picture is characteristic. The blood undergoes autolysis, becomes partly digested, and the white cells emigrate into the affected areas in

large numbers. These changes cause the hemoglobin to become somewhat transformed into methemoglobin, and this to become further broken down into simpler compounds. These changes, with the added leucocytes, give the grayish appearance referred to as gray hepatization.

The **urine** shows the febrile changes in increased degree; the **pulse** is usually quick and somewhat irregular. The respiratory rate is very high, especially in relation to the pulse—a 1:2, or 1:1.5 ratio is sometimes seen in patients who recover. The **blood** in strong individuals shows marked leucocytosis, sometimes to 25,000, with a high neutrophile percentage. The neutrophiles present a less immature appearance.

During this stage the treatment should follow the outline previously given for the first stage, plus efforts to maintain the oxygen intake. When the condition of the lung is recognized, it is evident that the supply of fresh air must be kept very plentiful. If the respiratory deficiency is considerable, oxygen may be given. It may be necessary to use an inhalation tube at first, but as soon as can be the oxygen should be allowed to escape slowly from a pipe near the patient's nostrils. The oxygen supply should be maintained until the lungs are well cleared out. During the hepatization the heart's action is labored, and the heart must be kept in as good a condition as possible by attention to the condition of the first to the fourth thoracic segments. The ribs, vertebræ, and muscles of these segments must be watched, and all lesions removed speedily. The colon must be kept clean by enemas given once or even twice a day, if necessary. The ordinary nursing, with reference to the teeth, etc., must not be neglected. The danger of hypostatic congestion must be remembered; the patient who is weak must not be allowed to lie too long a time in any one position, but must be moved to new positions, so that the blood may not gravitate constantly into the same areas. During this stage treatments should be given once to three or four times each day. It is often necessary to remain almost constantly within call, for hours, if the patient is to have his best chance of recovery.

Stage of Resolution. The termination of hepatization should be resolution. The coagulated blood undergoes digestion, partly as the result of autolysis, partly as the result of the activity of the leucocytes, partly as the result of fatty changes going on in the blood, thus freed from its vessel walls. The liquid thus produced varies in color, from variously digested pigments, and is thin. Much of it is coughed up, by the loose and efficient cough, and some of it is absorbed into the general circulation and thus carried away. The treatment should be devoted to facilitating resolution; this is best done by maintaining a constant temperature within the thorax—this is the place for the cotton wrappings and the

antiphlogistin and the various wrappings that are employed for the purpose of maintaining a constant temperature of any part of the body. The patient's respirations become more easy, the loose cough diminishes, and he seems on the road to recovery. The fever drops by crisis, often below normal, sometimes with fatal collapse. The patient is left very weak, but the delirium and pain disappear with almost magical celerity. This is the time during which cardiac failure is a serious danger. The absorption of the resolved liquid may allow infection of distant parts of the body; the meninges, intestinal tract, and any of the mucous or serous membranes may become the seat of pneumococcus infections.

The elimination of this material is a serious matter. The kidneys often show the effects in a nephritis of varying severity. The kidneys, heart, skeletal muscles, and brain, examined during death in resolution, show fatty metamorphosis and other symptoms of intense toxemia. All these organs must be guarded from strain during the resolution, absorption and elimination of the lung detritus. The patient must remain in bed until every sign of danger has passed, and he must not try to engage in any strenuous labor, nor any intense mental effort, for several weeks after the temperature falls to normal.

The **blood** shows secondary anemia, and there are many ragged and degenerated and senile leucocytic forms. The urine is that found during recovery from almost any fever. The pulse increases in strength and regularity, and the appetite increases. It is often difficult to keep a patient in bed, or to hold him to a rigorous diet, as long as is safe, for he rebels against confinement when he feels so well. The weakness is often profound, and while the sense of weakness is unpleasant, it yet may prevent too strenuous exertion during this critical period.

Stage of Organization. In some cases the resolution does not completely occur. The coagulated blood undergoes organization, the migrating cells and the leucocytes, with perhaps other cellular elements, form masses of rather dense connective tissue, which fill the alveoli. This condition is not usually immediately fatal but it lessens the usable lung space, and is apt to become the seat of later infectious processes.

Complications. Headache is present with the fever. Alcoholic patients are prone to delirium, at the onset of pneumonia. The pneumococcus may invade the meninges, whereupon the symptoms of cerebrospinal meningitis are produced. When the infection is limited to the cerebral meninges, the diagnosis may be very difficult. The toxins of the disease may cause somnolence, delirium, and other nervous symptoms, without meningeal infection.

Especially in the weak, very young or senile, the disease is apt to be associated with low delirium—with no meningeal involvement. Cerebral symptoms are avoided by preventing undue excitement, and by keeping the cervical muscles and other tissues in normal condition.

Pleurisy is to be expected. When the pleuritic involvement is marked the respiratory pain is more severe; coughing also is very painful. When the pleuritic symptoms are conspicuous, the disease is called pleuro-pneumonia. Effusion often occurs, and may be overlooked in the severity of the lung symptoms. The fluid is richer in fibrin than is the more frequent pleurisy with effusion. Invasion by the pyogenic bacteria may result in empyema. These conditions are avoided, in most cases, by the treatment outlined for the pneumonia.

Pericarditis and **endocarditis** are frequent complications and sequelæ. These are avoided by keeping the patient very quiet from the beginning of the disease, and by preventing too hasty return to the upright position and to the ordinary duties of life. Lesions of the upper thoracic region should be prevented or corrected. Thrombosis may occur, and lead to sudden death, or to cerebral involvement. It is not possible to guard against this complication, except as the maintenance of good circulation may prevent abnormal blood states, and the usual treatment for the disease may facilitate recovery.

Rarely, nephritis, neuritis, parotitis, arthritis, gastritis, colitis or hepatitis may result from the invasion of the organs mentioned by the pneumococcus. The treatment as above outlined provides the necessary protection; plus the usual hygienic care of the body as a whole.

"A specific treatment, directed toward the relaxation of the tightened muscles about the chest and the dorsal spine and toward the raising of the ribs, can be given with profit every four hours during the first twenty-four or possibly forty-eight hours, according to the conditions, and as frequently thereafter as conditions demand."—C. A. Williams.

"The important symptoms to be controlled are the dyspnea, cough, pain, tympanites, fever, toxemia, and weakened heart action.

"The dyspnea may be controlled by elevation of the ribs and by draining the congested lung to some other part. This may be accompanied by pressure in the lower dorsal, dilating the abdominal vessels, or by hot abdominal packs, or hot leg packs to dilate the surface blood vessels of lower extremity. The cough may be controlled by the above measures, and in addition work on clavicles and first and second ribs and at the fourth dorsal. The pain is controlled by separation of the ribs, relieving the pleura of pressure and securing efficient lymphatic drainage of the affected area by separation of the ribs and relaxation of the axillary structures. . . .

"Treatment should be given frequently, once in six or eight hours at least. . . . Manipulations should be given by slow movements across the muscles, using strong pressure throughout the dorsal region and cervical area to thoroughly relax the musculature and interosseous structures. . . . Dr.

Whiting showed us that treatment in the lower dorsal and to the liver and spleen will increase the opsonic index for a period of from six to eight hours." —G. V. Webster.

"In case of extreme delayed resolution, particular attention should be given the region of the fourth dorsal vertebra, as treatment at this point will assist in strengthening the heart, which has to work against heavy pressure in these cases. All cervical lesions should be carefully searched out and corrected, and the neck muscles kept in a state of relaxation throughout the course of the disease."—J. A. Overton.

The labored breathing in pneumonia can be relieved to some extent by careful and gentle dilatation of the nostrils. For this purpose an ordinary wire dilator may be used.

Prognosis. Recovery is to be expected in adults, who receive proper attention early. Cases aborted during the first stage are hardly to be diagnosed; thus it is not possible to know how many such cases are to be found. If treatment is delayed until after the symptoms of hepatization, recovery can only be expected after resolution—the coagulated blood cannot be absorbed until after it has been digested and made fluid. The prognosis is much more serious in elderly patients, in the very young, and in persons who are weakened from other diseases. Pneumonia is a good friend of the aged, the defective, and the insane—many deaths occur in these unfortunates, no matter how well cared for. It terminates, not too painfully, many unhappy and useless lives.

EPIDEMIC CEREBROSPINAL MENINGITIS

(Brain fever; cerebrospinal fever; spotted fever; epidemic spinal fever; malignant purpuric fever)

This is an acute infectious disease, characterized by irregular course, moderate fever, and profound nervous symptoms; it is due to the diplococcus intracellularis meningitidis. It may be sporadic, epidemic, or pandemic.

Pathology. The disease is essentially an acute inflammation of the pia-arachnoid; the dura is involved later. Almost every organ in the body shows the effect of the invading bacteria—pericarditis, sometimes endocarditis and myocarditis show the cardiac effects; kidneys and liver show granular and sometimes fatty degeneration; spleen and liver are enlarged and full of blood; lungs show bronchitis and pneumonitis; skeletal muscles show granular degeneration; nerve trunks show neuritic changes; the brain and the cord are variously injured. Meningeal spaces and ventricles are filled with a fluid, first only increased in quantity, later containing white, then red blood cells, and bacteria; still later the fluid is purulent and of greenish yellow color.

After recovery, adhesions between the thickened pia-arachnoid and the dura, or the cord and the brain, are frequently found; these adhesions may be responsible for many symptoms occurring for months, sometimes for years, after recovery from the acute disease.

Etiology. The diplococcus meningitidis is the infectious agent. It resembles the pneumococcus in many respects, and the gonococcus in other qualities. It is biscuit shaped, and is found within

the leucocyte protoplasm, but not within the nucleus. It is recovered from the cerebrospinal fluid, the nasal secretions especially, the pus, the urine, and probably other secretions. With this organism other bacteria are usually associated—the pneumococcus, bacillus coli communis, and various pyogenic organisms.

Bony lesions of the cervical and upper thoracic region appear to predispose to the disease. Lesions of the upper ribs are reported. Occiput, atlas and axis lesions are present in some cases; these lesions have been found in a few patients who afterward became infected. Various bony lesions result from the inflammatory process, and these may perpetuate certain symptoms for months after the acute attack has passed.

Children and young adults are most frequently affected. The disease is almost unknown in warm climates; it is most prevalent in the Northern areas of the temperate zone. Unhygienic surroundings predispose; crowding, as in the slums and in barracks, prisons, and orphan asylums encourages the spread of the disease.

The infectious bacteria may be carried from one person to another by means of the nasal or other secretions; these may retain their virulence for some hours; possibly for some days or weeks. Fomites may be responsible for the spread; older adults are often "carriers" and may spread the disease through uncleanliness in regard especially to nasal secretions.

The mode of entrance into the body is not known. Breathing infected dust may permit the infection of the nasal passages, whence the blood and lymph carry the bacteria over the body. Direct extension by way of the nasal lymphatics and the olfactory nerves is not improbable.

Diagnosis. This is based upon the symptoms, especially in an epidemic, and upon the recognition of the specific bacteria in the nasal secretions and the cerebrospinal fluid.

The **incubation period** is unknown, though brief; probably three to ten days. Prodromal symptoms vary; the onset may be frightfully sudden, or there may be a few days of lassitude, backache, headache, and slight feverishness. Nausea and vomiting may occur as prodromal symptoms. Most cases have rather sudden onset in the afternoon or early night. Fever is moderate; headache and backache are extreme; children may have convulsions; retraction of the head, opisthotonos and spinal rigidity are marked. Vomiting may be serious; sometimes projectile. During the first few days the fever varies, rarely going above 103° after the first day. In rapidly fatal cases, the temperature may reach remarkable heights—110° or more, at death. The pulse is accelerated practically with the fever. Hyperpnea and Cheyne-Stokes breathing may occur; respirations may be slowed by pressure upon the bulbar center; death may occur from this.

Hyperesthesia is marked; the slightest sensory stimulation of any kind is intensely painful, and increases the muscular rigidity. Coma and delirium may appear early; they are rarely absent in mild cases. Especially toward night there is a tendency for the delirium to become hysterical in females, and maudlin or sentimental in males; eroticism may be noticed; priapism and emissions are not rare in males. Muscular twitchings, spasms, and choreic movements may occur; paralysis is rare. Herpes is common. A petechial, purpuric, or urticarial eruption is frequent; whence the name "spotted fever." In severe cases the skin eruptions, bedsores, and ecchymoses may terminate in gangrene.

The **blood** shows moderate leucocytosis; water is usually deficient. The urine shows ordinary changes of acute fevers; occasionally the nephritis may be serious. Reflexes are increased; Kernig's sign is usually present but is not in itself pathognomonic.

Rudimentary types are very mild; the diagnosis would probably not be made except during an epidemic.

Abortive forms begin with marked symptoms, which speedily disappear; recovery is rapid, and the entire disease persists only for a week or so.

Intermittent forms are characterized by remarkably rapid improvement at intervals for two or three days; these are followed by equally rapid exacerbations within a few hours or a day.

Typhoid forms are characterized by a steady, slow course, with stupor and coma, and extremely slow recovery or delayed death.

Fulminant type; apoplectic type, begins very suddenly, runs a rapid course with death, sometimes within a few hours. When death is delayed for a few days, the eruption is purpuric and involves the mucous membranes and the meninges. All symptoms are extremely intense; the pulse is usually slow and feeble.

Complications. The eyes are often inflamed. Conjunctivitis, iritis, retinitis, panophthalmitis, optic neuritis, may result in blindness after recovery from the acute disease. Inflammation of the internal and middle ear is not infrequent, and partial or complete deafness may result. Involvement of the nerves at the base of the brain may cause permanent facial paralysis, usually with hemiatrophy. Infection of the lungs with the ever-present pneumococcus or tubercle bacillus may hasten death. Pneumonia is usually speedily fatal. Infection of the pericardium, myocardium, and endocardium are frequent; sudden death may be due to these inflammations, or the heart may be left injured after recovery from the acute disease. The liver and spleen are always involved, but these usually recover with the disappearance of the acute symptoms. The kidneys are seriously infected, and may be left with

varying degrees of parenchymatous nephritis; death may occur from this, months after the symptoms of meningitis have disappeared.

The brain and cord are often associated in the inflammatory process. Permanent paralysis of certain muscle groups is not infrequent. Cerebral injury may leave the patient with mental defect; in a child, this may cause idiocy, imbecility, or feeble-mindedness, or may merely diminish slightly his capabilities in mental development; in adults dementia, chronic confusional insanity, or merely an emotional instability may persist. Confusional states and memory defects may persist for a time, and then pass away.

Treatment. The sick room must be clean, well aired, quiet and dimly lighted. Only the nurse should be permitted within the room, and all noise and confusion carefully avoided. The pain that is caused by the least noise, or by being compelled to move or to talk, or by moving objects or lights, is beyond imagination. During the high fever, fruit juices alone are permitted; much water is given; the patient is not to be disturbed except at long intervals for water. The lips may be kept moist by a cotton pad in ice water, a small amount of this water may be swallowed, when the patient is too sick to drink. This constant washing of the lips is pleasant and grateful; it may prevent labial herpes. With subsidence of the fever, liquid foods, milk, vegetable juices and broths may be given in greatly diluted form and at diminishing intervals. Convalescence may be shortened by providing nutritive food as soon as it can be digested and absorbed. A bent glass tube should be used; the patient should not be compelled to make any exertion. It is essential that a good nurse be provided; proper feeding, changing, bathing, and attention to the bedding, and to the bowels and bladder of the patient can only be secured through the care of a well-trained nurse. This skillful care may mean life instead of death; certainly it means a more speedy recovery, with less of suffering during the attack.

The patient should not be permitted to remain upon his back; the lateral or the prone position is much better. The weight of the body upon the back increases opisthotonos; the influence of gravity increases the meningeal congestion, when the patient lies supine; and this position encourages heat retention in the spinal tissues. The lateral positions are far better in every respect; though the patient has a strong tendency at all times to assume the supine position.

From the beginning of the disease until convalescence is well established, a very gentle general spinal treatment should be given once or twice each day. If the symptoms recur, this treatment may be repeated at intervals of a few hours; otherwise, the visits may be postponed for a day; later, the intervals are increased;

but it is much better to risk an extra visit than to allow too long an interval to elapse.

Ice bags are of great value. An ice cap to the head gives great relief; ice bags to the neck often reduce the retraction of the head and give sleep; long, slender bags to the spinal region relax muscles and lessen hyperesthesia. A hot water bottle may be placed at the feet or, rarely, over the abdomen, if there is a tendency toward too great chilling.

Prognosis. The prognosis must be guarded in all cases, especially with reference to sequelæ. Not for weeks after apparent recovery may one be sure ill effects are not left by the inflammation. Recovery is usually to be expected, except in the apoplectic or fulminant types; there is much variation in the virulence in different epidemics, therefore in certain types everything depends upon early, vigorous and constant attention. It would seem that Flexner serum is of value in the severe types, in comparison with previous medical methods. The sequelæ have already been mentioned under the head of "complications."

INFANTILE PARALYSIS

(Acute anterior poliomyelitis)

This is an acute infectious disease of the spinal cord, characterized by sudden onset with high fever, and complete paralysis of one or more limbs or muscle groups, followed by rapid atrophy of the paralyzed limbs. Pain may be present at the onset of the disease, but there are no permanent sensory disturbances.

Etiology. The disease is due to a streptococcus (Rosenow) or micrococcus (Nuzum) of peculiar variability. Grown without oxygen it is filterable; grown aerobically, it attains greater size and wider virulence. It can be cultured from tonsils and nasal and other secretions, and the culture produces the disease in several lower mammals, from whom identical or variable cultures can again be secured. The manner of transmission has not yet been determined. Flexner's experiments show that it is quickly destroyed by the blood, though it lives for some time in the lymph or mucous secretions. The point of entry is probably by the nasal passage and upward through the cribriform plate by way of the lymph spaces surrounding the nerves and blood vessels passing into the nasal cavity. Most animals are subject to this infection though they do not all show typical paralytic symptoms and in them it frequently runs a much more chronic course. It is probable that pet dogs or cats who carry this disease in its chronic form may be responsible for the appearance of sporadic cases in children or may even initiate serious epidemics. One attack gives immunity. There are few exceptions to this statement.

Other infectious agents such as those of diphtheria, measles, pneumonia, scarlet fever, malaria and furunculosis may gain entrance to the anterior gray matter of the spinal cord and give rise to symptoms not to be distinguished from those due to the epidemic form of infantile paralysis.

Exposure to cold and sudden check of perspiration, wading in cold water, or some trauma, such as a blow or fall or jar are often given as causes of the disease by parents. These factors may easily be contributing causes by lowering the resistance of the body to infection. Experimental work done upon animals by C. P. McConnell and others shows that such factors as those already mentioned may interfere with the circulation through localized areas of the spinal cord. Thus it is very probable that trauma, temperature variations, etc., may act as predisposing factors not only in a general but also in a rather strictly localized way.

The disease is very much more frequent during the summer months and especially in dry weather when the germ-laden dust is more plentifully inhaled and flies are plentiful. Both sexes are afflicted in about the same way.

The favorite age is from one to four years. Children are said to have been born with the paralysis though it is not certainly known that intra-uterine infection really exists. The difficulty in making the differential diagnosis between this and other causes of congenital paralysis is easily seen. The earliest typical case on record is that of an infant four days old. It rarely occurs above ten years of age though it has been known to affect men and women up to thirty or more years. (See Landry's paralysis.)

Pathology. The effects of the disease are marked in the anterior gray matter of the spinal cord. During the acute stage profound inflammatory changes are found in the gray matter. These are followed by degeneration and atrophy of a large number of nerve cells including all of the large multipolar cells in the affected areas. The nerve fibers degenerate and disappear and the muscles undergo very rapid atrophy. The bones and the joints normally moved by these muscles also cease growing to a very marked extent. Contraction of the tendons of the paralyzed muscles together with the wasting of the joint tissues brings about various deformities.

Symptoms. Like other acute infections this disease begins with fever, which goes up to about 103°, rarely 105°. This may begin with a chill and may be associated with profound perspiration. The temperature usually returns to 101° or 102° within a few hours or a day and remains at that point for several days. Vomiting, rigidity of the neck muscles, and pain on movement are characteristic symptoms. There is not usually more than a week after the onset until the fever has completely disappeared. Death may occur during the first and marked hyperpyrexia. Opisthotonos may suggest meningitis. Delirium and convulsions may occur. In about 90% of the cases digestive disturbances, nausea, vomiting, and diarrhea are present. Sometimes the fever is not

marked, digestive symptoms are absent and there is only a few hours or perhaps a few days of slight malaise. The thermometer would probably always show some rise of temperature in such cases but this apparently mild attack very frequently evades notice.

The paralysis is first noticed on the first to fifth days. At first it includes a very widespread area. There may be great pain in the joints and muscles when motion is contemplated. The skin, muscles and bones are frequently hypersensitive to pressure. With the passing of the fever the sensory symptoms abate. The extent of the paralysis diminishes rapidly for a few weeks; more slowly for a few months. At about three or four months after the acute attack the true extent of the paralysis is usually evident. At first the paralyzed limbs are cold, mottled and edematous. In the cases in which the fever is not noticeable the paralysis seems to occur very suddenly with no prodromal symptoms whatever.

The right leg is somewhat more often affected than the left. Both legs are affected rather less frequently than either alone. If both an arm and leg are affected they are usually upon the same side of the body. Rarely the muscles of the back are involved; this may produce a lordosis or scoliosis. Sometimes the disease affects the medullary motor centers. The third, fourth, sixth, seventh, and twelfth nerves may be paralyzed. Torticollis may result when the eleventh nerve is involved. When the visceral centers in the medulla are affected death results at once.

Hypertrophy of the opposing muscles or of the nonparalyzed limbs may be very marked. The arms may become so strong and large as to suggest partly replacing in function the paralyzed legs. Remarkable accounts of hypertrophy of the tongue and its assumption of very complex functions are recorded in cases in which the paralysis involves both legs and both arms.

Diagnosis during the acute stage may be difficult. The sudden onset, with gastro-intestinal symptoms for which none of the usual causes can be found, rigidity of the posterior neck muscles, sometimes of other spinal muscles, and evidences of pain upon movement, should indicate the diagnosis, which is only to be considered definitely established with the onset of paralysis. After the acute stage has subsided, the history of sudden onset with no anesthesia and no bladder symptoms, the atrophy of muscles and bones, the lack of reflexes and the reaction of degeneration in the affected muscles should make the diagnosis easily evident. Every case of sickness in children should be viewed with suspicion during an epidemic, but it is not possible to make the diagnosis until the occurrence of localized hyperesthesia or paralysis.

Acute transverse myelitis rarely affects children and in this disease the bladder and rectum are involved and bedsores appear very speedily.

Multiple peripheral neuritis is rare in children. There are gradual onset, and more severe pain; the muscles and nerve trunks are very sensitive to pressure, and there is a history of alcoholism or some other cause of the neuritis.

Spinal hemorrhage has more marked sensory symptoms. Pain and temperature-sense are lost speedily. The bladder and rectum are usually paralyzed and some muscle groups are not affected. Progressive muscular atrophy has a gradual onset and the paralyzed area increases constantly in extent.

Spastic hemiplegia due to cerebral lesions is characterized by rigidity of the limbs; increased reflexes, no reaction of degeneration and atrophy is either not present or else is very diffuse. Erb's paralysis involves the deltoid, biceps, brachialis anticus and supinator longus, rarely other muscles, and is due to birth injury; diminished cutaneous sensation is usually present over area supplied by the fifth and sixth cervical nerves. This location and the history of birth trauma should make diagnosis easy.

Treatment. During an epidemic, all children of susceptible age should be examined, and all bony and other lesions corrected. Food and other conditions of hygiene should be investigated. These factors are important in preventing the disease, and in increasing the resistance of the body to the disease.

Every sick child should be isolated; every child with fever should be put to bed in a quiet room, protected from insects. During the fever, plenty of cool water should be given, and perhaps some of the fruit juices; nothing more of food. Usually an enema is needed the first day; sometimes for several days. The fever can be controlled by sponging with water at the skin temperature. These things must be done with great care, to avoid painful movement.

It is most important that the child should not be allowed to lie upon the back. The left or right lateral position is usually comfortable and is very good. No weight of bed clothes should be permitted upon the body; a frame is easily arranged for their support. Movements are painful, and rest is greatly to be desired.

The osteopathic treatment includes also the relief of the muscular rigidity. Extension of the neck and the spinal column generally and very gentle movements for the relief of the spinal rigidity are usually attended with relief of the pain and this should be given two or three times each day during the acute stage of the disease. As the fever subsides, the extent of the paralysis becomes evident. As soon as manipulations are not painful, massage of the affected limbs, following the course of the nerve trunks to and including the muscles, is helpful. This is not to be done when any pain is produced. The diet should return to the normal gradually, after the fever disappears.

Even after the paralysis is complete, much help can be given by osteopathic treatment. There is good reason to believe that a better circulation through the spinal cord promotes the recovery of cells which have been injured but not destroyed by the infection and also promotes the assumption of increased duties by nerve cells of an immature type. The massage and stretching of the injured muscles gives some good results in the earlier weeks. It is of less value after the third or fourth month.

Violent stretching of the muscles and tendons under anesthesia is sometimes followed by the correction of deformities of the limbs, though a dangerous operation unless skillfully done. Tenotomy and myotomy are performed for the sake of lengthening the contractured tendons and muscles. Arthrodesis is sometimes performed for the sake of giving fixation in those joints left abnormally flexible.

Tendon transplantation is the shifting of the tendon of one of the normal muscles on to the paralyzed side of the bone. In this way a fairly good amount of control is frequently secured. Neuroplasty is performed in two ways. Sometimes a healthy nerve is split and one end is sewed into the paralyzed muscle. Or, the paralyzed nerve trunk, when it can be found, is sometimes set into a healthy nerve. In either case nerve filaments grow into the paralyzed muscle by the slow process of regeneration and ultimately the muscle returns to something of its normal tone. The nerve centers in the central nervous system must be reëducated in such a case in order that volitional control may be secured. The osteopathic treatment of patients for whom any of these orthopedic measures are being employed should never be forgotten. No matter what mechanical and surgical methods were helpful in these cases, still, the maintenance of the best possible circulation of good blood through the affected area and through the spinal centers in close connection with the injured areas must be an extremely important factor in promoting an efficient recovery. Treatment should be kept up periodically for years if necessary.

"Lesions requiring osteopathic skill are so obvious that the slowest may read as they run. . . . The three-minute, specific-lesions osteopath should let these cases alone; they take exquisite care and patience and an almost painful regard for details. The words "paralysis," "crippled," afflicted," are positively and entirely eliminated from the family vocabulary. . . . During the acute stage, rest in bed is essential. As soon as condition permits, begin giving gentle massage every three hours during the waking time. As strength returns, the patient is given joint movements with the massage, then resistive movements, first passively, then actively. Go slowly rather than over-tire. Devise plays to bring the muscles into use . . . A "walker" is of great value. . . . A six-strand wire stretched across room with pulley running along it offers a splendid opportunity for leg and arm work. . . . We do not lessen his difficulties because of his condition, but rather increase them. . . . "He loves best who does least." . . . There is never a time to be discouraged. Persistent and conscientious treatment is the essential."—Evelyn R. Bush.

"Paralyses of central origin can be but little benefited by osteopathic gymnastics, while those of superficial or spinal origin may be greatly aided. If there is any voluntary motion possible in the fingers or toes, the nerve cells controlling the musculature to these parts are not entirely destroyed and new nerve paths may be developed or old ones restored. To accomplish either, however, it requires time and perseverance.

"Briefly, the line of procedure is thorough osteopathic manipulation followed by assistive and, later, resistive movements. Last of all, single movements are prescribed. Assistive movements mean movements willed by the patient, but executed by the operator. Resistive movements are performed by the patient and resisted, according to the patient's needs, by the operator. Single movements are exercises performed by the patient without outside assistance or resistance."—A. A. Gour.

ERYSIPELAS

(Erysipelatous dermatitis; the rose; St. Anthony's fire; cryptogenetic erysipelas; ignis sacer; wildfire)

Erysipelas is an acute, specific, infectious disease, characterized by more or less severe febrile reaction and a peculiar inflammation of the skin, generally of the neck or face. This inflammation exhibits a marked tendency to spread, to induce serous infiltration and suppuration of the areolar tissue, and to affect the lymphatic vessels and glands.

Etiology. The exciting cause is the streptococcus erysipelatis of Feheisen. The predisposing causes are lowered vitality, existence of abrasions and wounds, the puerpural state, and chronic alcoholism. Lesions of the upper dorsal, second to fifth, of the middle and lower cervical vertebræ, affect the vasomotor nerves either directly or through the fifth cranial nerve and also the lymphatic circulation.

"When the case is one of facial type, which is the most common, then I generally find trouble with the articulations of the inferior maxilla, the cervical vertebræ, the clavicles or the upper ribs."—Dr. A. T. Still.

The virus clings to rooms and furniture and can be conveyed by a third person. The incubation period is from two to seven days.

Diagnosis. The onset is usually sudden with chill, nausea, vomiting, malaise, headache, and pains in the limbs. The temperature rises to 104° to 105° F. with very slight remissions during the course of the disease. The pulse is correspondingly increased. The tongue is coated, diarrhea or constipation is present and delirium is frequent. The cervical lymph glands are swollen. The eruption soon follows the initial chill appearing as bright red spots upon the bridge of the nose, cheeks, or at the junction of mucous membrane and skin. These spots rapidly coalesce, so that the external symptoms are well marked within twenty-four hours. This area is swollen, firm, hot and tender to the touch, pain-

ful, and pitting on pressure which also increases the pain. The edges are raised, hard, and more elevated, thus forming a sharp line of demarcation from the surrounding healthy tissue.

The patient complains of heat, tingling, itching, and burning of the infected area. Vesicles and blebs are frequent upon the surface of the inflamed area. The edema of the surrounding parts is marked so that when the face is involved the features are distorted out of all recognition. The eruption begins to subside after five or six days, followed by moderate desquamation of large or small flakes. The fever declines by crisis. The mucous membranes of the mouth and pharynx may become involved. In the puerperal form the genitals may be involved.

Phlegmonous erysipelas is attended by marked infiltration and suppuration of the areolar tissues. Erysipelas ambulans or migrans is shown by the eruption being migratory in character, disappearing in one place to appear in another location. The duration is from ten to twelve days.

The complications include local suppuration especially small skin abscesses; septicemia; ulcerative endocarditis; edema of the larynx from extension of the eruption; thrombosis of the cerebral vessels; rheumatism; and nephritis. Elephantiasis may follow frequent relapses. The irregular fever, the early spreading eruption with burning, swelling, tension, and sharply defined border, and the albuminous urine, will distinguish it from the eruptive fevers, eczema, and erythema.

The urine is scanty, highly colored, albuminous, and may contain the specific bacteria.

The specific bacteria may be found in the bone marrow during the acute stage. Polymorphonuclear leucocytosis is almost constant, and is proportionate to the temperature and the extension of the infection. The eosinophiles are diminished or absent, as the leucocyte count falls the eosinophiles may rise considerably.

Treatment. The patient should be isolated from surgical and puerperal cases. The physician attending a case should not attend confinements or surgical operations.

The correction of the bony and muscular lesions wherever found is important. Increased flexibility of the lower thoracic spinal column, and of the entire thorax, is usually indicated.

For the restlessness and insomnia, treatment of the upper cervical region, especially the deep, steady pressure to the posterior muscles, gives relief.

Diet should be liquid and nutritious.

For the local treatment, no manipulation can be used. Hippocrates used cold water as an application; it gives much relief. Clay poultices are recommended. Local application of vaselin will assist in relieving the tension. In migrating erysipelas ad-

hesive strips along the border of the lesion will compress lymphatics and interfere with spreading.

Prognosis. The outlook is favorable except in alcoholics and the aged. In the new-born, erysipelas of the navel is usually fatal. In the ambulatory form, death may occur from exhaustion.

ACUTE ARTICULAR RHEUMATISM

(Inflammatory rheumatism; acute rheumatic polyarthritis; rheumatic fever)

Acute articular rheumatism is an acute, noncontagious febrile disease characterized by a polyarthritis, a tendency to hyperpyrexia, a special tendency to involve the pericardium and endocardium, and in children often associated with chorea.

Etiology. The infectious agent is the streptococcus rheumaticus (Rosenow). This is one of the bacteria subject to marked mutations through environmental changes. It gains entrance into the body through some previous infection, and in about 90% of cases is preceded by symptoms of acute angina. The virus may gain entrance into the blood from some nidus, as tonsillar pockets, abscesses around the roots of the teeth, or elsewhere.

In addition to the presence of pus in the body, the usual causes of lowered immunity are of etiological importance. Bony lesions, especially of the lower thoracic region, as well as lesions which interfere with nutrition or excretion are important. Young adults are most often affected. Overfatigue, exposure to sudden change in temperature, especially cold and dampness, and other factors of diminished resistance, are predisposing factors.

Pathology. The synovial membrane is hyperemic, there is swelling, effusion, usually turbid, containing albumin but seldom purulent, and the ligamentous structures are swollen and the cartilages are slightly eroded. The complicating pericarditis, endocarditis, pleurisy, and myocarditis show the changes of an inflammatory process.

Diagnosis. In some cases there may be prodromal symptoms of a feeling of malaise, more or less soreness, these beginning very often after an attack of tonsillitis, and rheumatic pains begin in one of the large joints, usually the knee, wrist, or ankle. The usual order of attack is knee, ankle, shoulder, wrist, elbow, hips, hand and foot. In other cases the onset may be abrupt with chilliness, loss of appetite, and the arthritic pain.

The temperature may not be very high, usually between 100° and 103° F. but hyperpyrexia is not uncommon, reaching 107° to 110° F. The fever usually reaches its height in twenty-four hours and is very irregular. The defervescence is gradual.

The pulse is rapid, full and soft. The tongue is usually very large, covered with a thick white fur—"blanket" tongue, there is great thirst, the bowels are constipated, the mind is clear except

during hyperpyrexia, and the weakness depends upon the amount of sweating.

Arthritis. The joint is at first red, hot, swollen, and intensely painful; later the joint may assume a dead-white appearance. Frequently the inflammation rapidly subsides in one joint to appear in another. The appearance is governed by the law of parallelism, affected joints either are on one side of the body or are symmetrical. Pain is increased by motion and pressure.

Sweating. Marked sweating is constant. The excretion has a peculiar sourish smell, and is acid at first, but neutral or alkaline later. Various hair follicles and cutaneous glands become inflamed and painful.

Subcutaneous nodules fibrous in character may develop over bony ridges.

The severe symptoms usually subside in about fourteen to twenty-one days. There is no disease more often attended with relapses.

Subacute form. All the symptoms are less pronounced. The case may drag on for weeks or months and finally become chronic. In children, it may be associated with pericarditis or endocarditis.

The **complications** include endocarditis, most frequent in youth, affecting oftenest the mitral valve, in about half of the cases; pericarditis, less frequent but insidious; myocarditis, slight or profound; pleurisy; chorea; hyperpyrexia, most common in a first attack, often attended by delirium and coma; skin eruptions as sudamina, miliaria, "pelioses" or small red petechial spots around the ankles and purpura, pharyngitis, and tonsillitis.

The heart should be examined daily. Murmurs of hemic or organic origin are often heard.

The blood pressure is high.

The urine is scanty, highly colored, often loaded with urates, chlorides diminished or absent, acetonuria is present, and the reaction is markedly acid.

Blood. There is an excess of fibrin but the coagulation time is increased. Red cells show a moderate anemia, being reduced to 3,000,000 cells or less. The lowest count is at the height of fever and regeneration begins with defervescence. It is rare to find nucleated reds. Hemoglobin falls to 55% or 75%. The moderate leucocytosis runs parallel with the severity of the disease. The proportional relations of the various leucocytes are well maintained. The eosinophiles are absent at the outset, present during the disease, and increased during convalescence.

The saliva may become acid and contain an excess of sulphocyanides.

Treatment. The patient must be absolutely at rest in bed, warmly covered. "I usually treat these cases from one to four times a day in the acute stage of the disease, paying particular attention to the eighth to twelfth dorsal. Once a day in these treatments I gently relax and spring the entire spine. Plaster bandages and splints of various kinds may be used, but I personally use snug muslin bandages with plenty of cotton under them, especially protecting the areas where the large blood vessels lie. . . . Manipulation of any kind in the stage of acute inflammation is absolutely contraindicated. After the acute inflammation has subsided passive movement of the joint and massage above and below the joint certainly aid in the reparative processes and help to prevent the formation of pseudoankylosis which sometimes follows in severe cases. . . . The next consideration is the tendency to endocarditis and pericarditis. Osteopathic treatment to the areas of the spine corresponding with the innervation of the heart tends to heighten the vitality and resisting power of these tissues. I usually apply the ice bag for four four-hour periods with intervals of two or three hours, and this application may be increased or lessened depending upon the severity of the cardiac symptoms."—A. D. Becker.

The diet should be fluid during the acute stage. Milk diluted with mineral water, lemonade, barley water, chicken broth should be given at regular and short intervals. The thirst should be fully satisfied. During convalescence, the diet should be more ample but nutritious, using red meat very sparingly.

Prognosis. Recovery is the rule in uncomplicated cases. When death occurs, it usually depends upon hyperpyrexia, cardiac complications, or cerebral endarteritis. Sudden death is due to myocarditis. Recurrences are best prevented by eliminating all predisposing causes.

Sequelæ may in a large measure be prevented by proper treatment from the beginning of the trouble.

CHAPTER XLVII

DISEASES DUE TO SPIROCHÆTES

RELAPSING FEVER

(Febris recurrens; famine fever; bilious typhoid fever; spirillum fever; seven-day fever)

Relapsing fever is an acute, infectious, contagious, epidemic, self-limited, febrile disease, characterized by a febrile paroxysm lasting about six days accompanied by high fever, and severe pains in the legs and head; this declining by crisis is succeeded by an afebrile period of the same duration, which in turn is followed by a relapse similar to the first seizure.

Etiology. The disease is caused by the spirillum or spirochæta obermeieri. The predisposing factors are overcrowding, bad hygiene, filth, poor food, impure air and destitution. Structural causes include lesions either bony or muscular interfering with nutrition and with circulation through the spleen and liver.

It is transmitted by fomites, by personal contact and probably by bed-bugs.

Diagnosis. The incubation is from five to eight days, sometimes from one to twenty-one days, with some complaints of malaise, lassitude and fleeting pains.

The invasion is sudden with heavy chill and temperature to 105° to 106° F. on the first or second days, soft pulse, 110 to 130, hemic murmur, frontal headache and vertigo, lancinating pains most marked in the calves of the legs, anorexia, nausea, and vomiting, intense thirst, tongue with a marked white fur, bowels constipated and great physical weakness.

The sense of fullness in the upper abdomen is due to the enlargement of the liver and spleen. Catarrhal jaundice is common.

About the seventh day the symptoms are aggravated, temperature reaches 107° to 108° F., the pulse 120 to 130, there may be slight delirium, and death seems imminent when sweating takes place, the bad symptoms rapidly abate, and the crisis is established. Within a few hours the patient feels comparatively comfortable and is ravenously hungry.

On the fourteenth day the symptoms all recur, perhaps intensified, these continue for about four days when second crisis is passed.

From one to five relapses are recorded. These occur at about seven day intervals.

Malignant form (Bilious typhoid fever; septic-bilious relapsing fever). The intensity of the symptoms of the ordinary form, with bilious or bloody vomiting, diarrheic stools containing bile-pigments, jaundice on the fourth to sixth day, and delirium indicate this form. More serious symptoms are collapse, purple nose, weak pulse, rigidity of the abdominal muscles, tenderness in the epigastrium, and cold, clammy skin. The mortality is high. Recovery takes place rapidly within two days if at all.

Pregnant women usually abort. Other complications are bronchitis, pleurisy, jaundice, albuminuria and hematuria, paralysis, ophthalmia, pneumonia, dysenteric diarrhea, and hemorrhages, all rare.

Blood. The examination of a fresh smear obtained during a febrile paroxysm will show the spirochæta obermeieri. During the afebrile periods, peculiar, highly refractive bodies resembling diplococci are found. These are thought to be spores and are especially numerous just before an attack.

Serum diagnosis is by Lowenthal's reaction which resembles Pfeiffer's phenomenon rather than agglutination. Leucocytosis is usually present.

Treatment. Immediate isolation and disinfection are necessary to prevent the spread of the disease. Put the patient to bed in a clean, well-ventilated room. Give a general manipulative treatment adjusting such structures as need it. Pay particular attention to the liver and spleen. Keep the excretory systems active. Look carefully to the lumbar region for lesions and relax carefully to control the pain.

The diet must be liquid and easily digested as the digestive powers are low from lack of food.

Careful nursing is necessary. Treat the symptoms as they arise.

Prognosis. In simple cases, recovery is the rule.

Prophylaxis. Isolation of suspected cases, disinfection of the patient, his excretions, and all articles used by him is necessary.

SYPHILIS

Syphilis is a chronic infectious disease due to the presence of the treponema pallidum (spirochæta).

Etiology. The treponema pallidum is a spirillum about one-half micron or less in thickness and from eight to forty or more microns in length. It may be transmitted from one person to another by direct contact or by intermediate objects. It may be transmitted by the ovum or the spermatozoon to the embryo and

thus it is a hereditary, infectious disease, the only one which is certainly recognized.

History. The site of the infection shows the **primary** lesion which is called a chancre. This begins as a small red pustule, which rapidly increases in size, then breaks down in the center forming a small ulcer. The margins of the sore are undulated and the ulcer extends somewhat beneath this undulated edge, giving a characteristic appearance to the chancre. Occasionally this ulcer is very small and may not attract attention. In about three fourths of all cases the ulcer is situated upon the genitalia, and is acquired through illicit sex relations. In Russia, about three fourths of all cases are acquired through kissing, and the chancre is situated upon the lip. Surgeons and obstetricians may suffer infection upon the fingers. The use of vaccine from the sores of vaccination may be a means of transmitting syphilis. Rarely the infection may be carried by intermediate objects, as the bed clothing, the common use of a fountain syringe, public drinking cups, public towels, and in other ways too numerous to mention. The favorite site of the chancre is a mucous membrane, though, as has already been suggested, it may appear upon the skin anywhere in the body. Chancre heals usually within a few days. The neighboring lymphatic glands are usually swollen, and this increase in size usually persists.

The **secondary stage** appears from six weeks to six months after the primary lesion. There is a slight fever, rarely above 101°, with a general feeling of malaise and other vague symptoms. Aching in the bones is rather characteristic. The lymphatic nodes over the body generally enlarge. A slight anemia is frequently present. Within a few days or weeks of these prodromal symptoms, the **eruptions** occur. Those upon the skin are extremely variable. An erythematous eruption is usually first and is most abundant upon the chest, other parts covered with clothing and occasionally the forehead. A papular eruption is very common, the papules are of various sizes and appear chiefly upon the flexor surfaces. **Mucous patches** appear upon the mucous surfaces. The distribution of the syphilids is usually very symmetrical. The outlines are rounded, and may present a map-like appearance with a coppery tinge. Later eruptions may be pustular or tubercular. These are usually gregarious and symmetrically placed. Other symptoms which occasionally appear during the secondary stage are alopecia, laryngitis, iritis, choroiditis, retinitis and other vague and apparently causeless inflammations of the mucous membranes of the body, the nails, the hair and the skin. The secondary stage may last a few months to a year, when the symptoms disappear. There is one form called **late secondary syphilis** in which the symptoms of the secondary stage may not appear for several years after the primary lesion. Usually the patient enjoys good

health for some months or years after the conclusion of the secondary stage, but this is not invariably true.

The **tertiary stage** is characterized by the appearance of a peculiar skin eruption. This is pustular at first, the pustules break and form ulcers with hard and sometimes laminated scabs. Syphilitic tubercles are especially characteristic of the tertiary stage. Both of these lesions in healing leave scars which frequently are of a coppery color, due to the stain of extravasated blood. Gummata are typical of the syphilitic manifestations, and consist of lymphoid, plasma and epithelioid cells with leucocytes. Great masses of these cells undergo fatty degeneration and ultimately a gummy or pasty mass results. These may break down with extensive ulceration or they may be slowly absorbed with no particular ill effects. No organ of the body is free from invasion by the gummata. When they occur upon bones, they may be very painful, but generally it is characteristic of the syphilitic lesion to cause little or no sensory disturbance. Amyloid degeneration, fibrosis, and arteriosclerosis are important constitutional changes following syphilis.

Syphilis of the **bones** includes synovitis, arthritis and the effects of the osseous nodes and gummata around the joints. The arthritis associated with osteomata is associated with very severe nocturnal pain. The joint symptoms are rather characteristic of the secondary stage, but are often present in the tertiary.

Syphilis of the **kidneys** usually appears in the tertiary stage. It includes amyloid degeneration, chronic and interstitial neuritis and gummata. Syphilis of the **spleen** and other lymphatic glands includes amyloid degeneration and vascular lesions. Syphilis of the **mouth and of the rectum are not uncommon** and are associated with ulcers whose effects may be fatal. In the case of the rectum a gradual stenosis may lead to death. Syphilis of the **lungs** is extremely rare. Fibrous infiltration or interstitial pneumonia or gummata may be present. Pulmonary syphilis is not easily distinguished from pulmonary tuberculosis except by finding the infectious agents. Both infections may be present in any case. Syphilitic endocarditis and myocarditis cannot be certainly diagnosed ante-mortem. Syphilitic **endarteritis** and gummatous periarteritis are important factors in the pathology of atheroma and aneurysm. (q. v.)

Syphilis of the liver may be congenital or acquired. The disease is manifested in its congenital form, either as a diffused cellular infiltration which produces at first enlargement and hardening, later, atrophic changes and irregularities; or as a gumma.

Acquired hepatic syphilis may show itself as diffused interstitial hepatitis, single or multiple gummata, amyloid disease, endarteritis, or chronic fibrous perihepatitis. Jaundice in the course

of syphilis and severe pain may be present. Symptoms of portal obstruction may occur as in ordinary cirrhosis, or, sometimes, the symptoms suggest abscess or cancer. The diagnosis is made by the history, and the results of the Wassermann or other specific tests. The outline of the liver is irregular and the enlargement is not uniform. If the gummata are accessible to palpation, they appear like flattened hemispheres, sometimes several being made out on the surface of the enlarged organ. If no syphilitic history is obtained, scars in the throat, nodes on the bones, or other signs of syphilis may be found.

Syphilis of the heart is a rather uncommon manifestation, usually affecting the myocardium with gummata or diffused fibrosis, or more rarely amyloid infiltration, and is occasionally a cause of aortic regurgitation, the heart usually not enlarged, and clinically manifested by rapid, irregular pulse, palpitation, dyspnea, and sometimes anginoid attacks.

Syphilitic Laryngitis. A common manifestation of this disease appears as a diffuse nondistinctive catarrhal laryngitis or as mucous patches, three to nine months after infection, or as gummata, either in acquired or congenital syphilis. The main symptoms are slight hoarseness and cough, somewhat painful deglutition, expectoration of free muco-purulent discharge streaked with blood or blackened shreds from an ulcer, and syphilitic evidences elsewhere in the body. Laryngeal examination shows superficial whitish ulcers in secondary syphilis. Small, round, symmetrical gummata rapidly becoming deep, punched-out, dark red, somewhat indurated ulcers with a mucopurulent secretion and necrosed tissue mark the third stage or there are deformed cicatrices, producing more or less stenosis. The mucosa is hyperemic and injected. There is more or less tenderness on pressure with the deep ulceration. The history, peculiar lesions, Wassermann reaction and other laboratory tests distinguish this from tubercular laryngitis, although tuberculosis may be present elsewhere in the body. Under treatment for the underlying condition, the ulcers heal rapidly, but the resulting cicatrices may impair the voice.

Syphilis of the Central Nervous System. The effects of syphilis upon the central nervous system are extremely variable. Gummata may appear anywhere upon the meninges and within the nerve matter. The symptoms thus produced resemble those produced by tumors of any kind in the same locations. The dura is especially subject to a gummy pachymeningitis. The symptoms produced in this way are chiefly due to pressure upon the nerve trunks. The syphilitic lesions of the blood vessels lead to profound injury in the brain and spinal cord. Thrombosis or obliterating endarteritis occurring in the brain leads to infarction. The

infarcted area undergoes digestion and softening. The examination of the syphilitic brain usually shows thickened gummy dura mater, a thickened milky-looking pia-arachnoid, and adhesions are likely to be found between these layers of the meninges and the brain itself. The blood vessels are tortuous and irregular. Capillary hemorrhages are frequent. Succession of aneurisms may cause certain arteries to resemble a chain of beads. Areas of softening or areas in which marked overgrowth of neuroglia has occurred may be present. Gummata may be single or multiple, large or small.

The **parasyphilitic** diseases occur several years or two or more decades after the primary lesion. The symptoms of this, which is sometimes called the quaternary stage, are usually limited to the central nervous system and are due to various degenerations in the nerve matter. Locomotor ataxia, taboparalysis, and paralytic dementia are the most common of the parasyphilitic diseases. It is frequently the case that these diseases appear in patients in whom the primary and secondary manifestations were very trivial. Indeed it is not rare to find these diseases occurring in patients who had not previously known themselves to have been infected and yet in whom the laboratory examinations have demonstrated almost certainly the usual cause of these diseases. There is some reason to believe that either by some specific reaction or as the result of some internal secretion the nerve cells are able to either neutralize the effects of the syphilitic poison or to deter the rapid multiplication of the treponema. Either because this antitoxin-producing activity exhausts the neurons or because the onset of a less vigorous time of life prevents the neurons from continuing these protective activities, the nerve cells and fibers do undergo degeneration at almost any time after middle life. Cerebral syphilis which usually occurs during the tertiary stage may be associated with a most complicated disease picture. Paralysis either sensory or motor or of the Brown-Sequard type, epileptic attacks, many hysterical phenomena, paralysis either of the upper or lower neuron type, retinal hemorrhages, atrophy of the optic nerve are only a few of the effects of syphilis in the brain. The gumma in the brain presents all of the symptoms of the ordinary brain tumor.

Hereditary Syphilis. Except for chancres the symptoms already mentioned appear in hereditary syphilis. Very frequently the products of syphilitic conception die very early in pregnancy. A considerable percentage of those born at term are born dead and of those born living about one fourth die within the first half year of their existence. Of those who live, many are mentally deficient, epileptic or become subject to the parasyphilitic diseases rather early in life. The newborn child may be greatly emaciated

and may or may not suffer from any one or more of a long list of skin and mucous lesions. Most of the children born alive are, however, born plump and apparently perfectly well.. Any time within the first few months of life a coryza first appears, this gives the symptoms of an ordinary bad cold and the child has snuffles, skin lesions appear usually within a few days, the liver and spleen enlarge, and other symptoms of the secondary stage appear. The child is fortunate if these are fatal. If recovery occurs from these symptoms, or if they have not appeared at all, the later symptoms of inherited syphilis may be expected, such as an earthy tint of the skin, retarded growth, imperfectly developed scalp, a general infantile appearance throughout childhood, a boat-shaped skull and deformities of the bones. The results of peritoneal inflammations are very common. Scars upon the skin with rounded or map-like outlines are usually located around the mouth and nose, upon the palate or over the lumbo-sacral region.

Hutchinson's Triad includes the Hutchinson teeth—that is, incisors which are very thin and with crescent-shaped notches in them; otorrhea, with deafness; and interstitial keratitis and iritis, affecting the eyes in succession.

Diagnosis. The diagnosis of syphilis may be extremely difficult or very easy. For many reasons patients often deny the existence of the disease and conceal as much as they can any history which might lead to its diagnosis. This difficulty would be made greatly less if the fact that syphilis is very frequently contracted innocently could be impressed upon the people in general. The examination of the skin should show the characteristic scars in the locations already mentioned. Examination of the serum expelled from the tonsil usually shows the presence of the treponema pallidum during the primary and secondary stages. The fact that the syphilitic eruption usually causes neither pain nor itching should be borne in mind. The Wassermann method with its modifications and the Noguchi test are fairly reliable, especially if the same findings are reported from two or more different tests. The cerebrospinal fluid probably shows lymphocytosis throughout the lifetime of a syphilitic patient. In congenital syphilis, the X-ray may show characteristic changes in the bones, especially in the radius and the fibula.

Treatment. The use of mercury and the iodides was long considered absolutely satisfactory and specific for syphilis. Since the vogue of the newer arsenic preparations, the evils of the older methods have been rather freely discussed. The arsenic is intended to kill, or to prevent the multiplication, of the treponema, without injury or at least with little injury to the body. The ignorant use of these methods is to be condemned—if they are the best

things for the patient, he should be referred to specialists in this line of therapy, if this is possible.

The value of the nondrug methods is yet to be seen. All such methods are based upon securing the greatest possible efficiency of the organs of elimination, with good body nutrition.

Oxygen Treatment. The treponema pallidum is absolutely anerobic. Cultures must be very carefully protected from oxygen, or they die speedily. This fact has been made the basis for a method of treatment. The attempt is made to facilitate the oxidation processes to the utmost extent. This is done by means of breathing exercises, which not only oxygenate the blood but also provide good circulation through the red bone marrow and exercise good effects upon digestion; by increased muscular activity, as in rowing or football, and hard work, as digging, etc.; by a diet largely of green vegetables and iron-containing foods, including a moderate amount of red meats but little starch or fats; by full water drinking, and the use of such fruits as have a diuretic effect. Citrus fruits are especially commended. Active elimination of all toxins is to be promoted by baths, enemas, massage, outdoor living, and the drinking of much water. Alcohol is forbidden, both on account of its effect upon the nerve tissue and also because of its effect in using up the oxygen and the water which are needed in destroying and eliminating the infectious agent. Tobacco is forbidden on account of the effect upon the body, and smoking on account of the carbon dioxid which is thus taken into the body. Excesses of all kinds are forbidden, both on account of their direct injury upon the nerve and other tissues, and also because they diminish the oxidation processes, and lessen the elimination of toxins.

Prophylaxis. Prevention is difficult on account of the fact that the disease is so frequently contracted as the result of illicit sex relations. The fact that it is so often contracted innocently is forgotten, whereas that fact should be especially emphasized, in order that concealment, with its opportunities for spreading the disease may be superseded by better sanitary methods. Any other contagious disease, hidden as a crime, would certainly spread much more rapidly; syphilis, recognized as an infection presumably the result of accident, could be controlled much more easily than when, as now, it is held to be proof of immorality of a certain type. The discussion of methods dealing with what is generally called the "social crime" is beyond the scope of this book; the solution of the problems connected with this aspect of human life will solve many other problems, as well as those of syphilis.

Marriage should be forbidden until at least two, and better four, years after active symptoms have disappeared. The danger to the wife includes that of the disease itself, and also the risk of

the miscarriages due to the death of embryo or fetus, and other obstetrical complications due to the effects of the disease. Still births and early death, inherited syphilis, and many deformities of body and brain, without the active manifestations of the syphilitic disease, are some of the effects produced upon the offspring of syphilitic parents.

HEMORRHAGIC JAUNDICE

(Weil's disease; acute hemorrhagic icterus)

This disease is becoming more frequently reported among soldiers. It may be identical with acute febrile icterus (page 566). Hemorrhagic jaundice is an acute infectious disease characterized by hemorrhages, fever, muscular pains, jaundice and usually very rapid recovery after several weeks' apparently very severe illness.

Etiology. The infectious agent is the spirochete icterohemorrhagica (spirochete nodosum). It is present in considerable numbers in the urine of those affected. It spreads with ease as the result of trench life, during the war; the use of bathing pools, or other insanitary conditions.

Diagnosis. The symptoms are as given in the definition. Nephritis, urticaria, cerebral symptoms, as coma, delirium, and other complications may be present. The stools are pale; the infectious agent may be recognized most easily in the urine. Injection of the urine into guinea pigs produces the disease. The spirochetes can be isolated from the blood and urine of the pig.

Treatment. This is symptomatic and palliative. The patient must be removed from unclean surroundings, the excretions carefully disinfected, and the fever treated as in other infectious diseases.

Prognosis. In uncomplicated cases recovery begins at about the fifth week; convalescence is rapid. The illness may persist for two months or more. In severe attacks death may occur from exhaustion, during coma or delirium, or from hemorrhages.

CHAPTER XLVIII

DISEASES DUE TO ANIMAL ASSOCIATES

PLAGUE

(Bubonic plague; black death; oriental plague; pest or pestis)

Plague is an acute, infectious, contagious disease, occurring in epidemics, characterized by great virulence and rapid course, accompanied by an inflammation of the lymph glands (buboes) or by pulmonary inflammation, and due to the presence in the blood and tissues of the bacillus pestis.

Etiology. The predisposing causes are insanitary conditions, filth, overcrowding, and warm weather. It is transmitted chiefly by fleas which spread the disease among rats, mice, cats, and ground squirrels and to man. These animals die of the disease in large numbers. They have the disease in a chronic form, living months, and spreading the infection widely. "Every city should be surrounded by a wide zone entirely free from these animals."—C. A. Whiting.

The contagion seems to be in the skin, the mucous membranes of the nose and pharynx. The incubation is two to five days.

Diagnosis. Premonitory symptoms are absent or very slight. Invasion is usually sudden with very high fever which drops with the appearance of the buboes, profuse sweating, unquenchable thirst, repeated attacks of vomiting, diarrhea or constipation, headache, suffusion of the eyes, sometimes rigors, great prostration and lassitude, delirium. Ecchymoses and petechial spots are common. The face has an anxious or dazed expression, the speech is thick and indistinct, the hearing dulled, the gait staggering, and the tongue is swollen, furred, dry and brown.

The Bubonic form occurs in 78% of cases. Buboes appear in the groin, axilla, or near the jaw on the second to the fifth days. They are usually single, large and very tender. There is enlargement of the spleen. In favorable cases the convalescence begins slowly from the sixth to the tenth day, but the buboes continue to enlarge, break down, and are discharged in the form of puslike material and sloughs, lasting for weeks.

In the **Pneumonic form** there are no buboes. High fever, prostration, cough, profuse, watery, blood-stained sputum which is almost a pure culture of the bacillus, and moist rales are characteristic. The physical signs are not proportionate to the severity of the symptoms. The mortality is very high.

In the septic or septicemic form the patient succumbs in three or four days from the intense virulence. The buboes do not appear. The ambulatory (pestis ambulans or pestis minor) is marked by a few days of fever and swelling of glands in the groin. The symptoms are very mild. These cases are a great danger to the community as the bacilli are contained in the urine and stools and hence spread the disease.

Blood. Bacillemia occurs. There is a leucocytosis of 20,000 to 30,000 cells during the active stage. Both polymorphonuclears and lymphocytes are increased. The eosinophiles are normal or decreased.

Agglutination of the plague bacillus occurs. It is rather difficult to obtain as a mild degree of spontaneous agglutination is liable to occur with normal blood.

Treatment. The treatment is mainly symptomatic. The cough, fever, and toxemia must be met here, as in other diseases. A very nutritious diet, mainly liquid, must be given. Fruit and vegetable juices with plenty of water must be given freely during the fever. A diet of fresh pineapple has been recommended.

Prognosis. The mortality is high in all forms. Death occurs on or about the third day, or later from exhaustion or complications. Recovery begins about a week from the onset.

Prophylaxis. Rigorous isolation is continued for a month after recovery. Disinfection of all excreta, discharges, clothes, and utensils must be thorough. Rats, mice and ground squirrels must be exterminated as far as possible and their bodies burned. Special care must be taken at seaports. Attendants and housemates of a patient must be disinfected and quarantined for ten days.

HYDROPHOBIA

(Rabies; lyssa humana)

Hydrophobia is an acute infectious disease, occurring in animals but communicable to man by inoculation and characterized by intense tonic spasm beginning in the larynx; delirium, coma and usually death.

Etiology. The infectious agent is probably a protozoan, which appears in the large ganglion cells of the brain, as one of the "Negri bodies." The same organism, though less easily recognizable, is found in the saliva and elsewhere. It is transmitted by the bites of infected animals, and the organism follows the nerve trunks to the cord and brain. Bites upon the face thus result in more certain and more speedy appearance of the symptoms, both on account of the plentiful nerve supply and the short distance

the infection has to travel in order to reach the brain. The bite of an animal known to be suffering from rabies is not always followed by the appearance of the symptoms. The bite of an animal not suffering from rabies cannot possibly produce the disease. Children are more susceptible than adults.

Diagnosis. Under ordinary circumstances, when there is reason to suspect rabies in a dog or cat, it is much better not to kill the animal, but to keep it alive, confined in a large, comfortable cage, where it can be watched and well cared for. If it shows no sign of further disease, or if symptoms of some other disease appear, the animal is evidently not rabic. If the animal dies, or has been unwisely killed, the brain should be placed on ice and sent to the nearest pathological laboratory for examination. The finding of the Negri bodies in the large ganglion cells of the hippocampus major, the cortex, or elsewhere is positive. Portions of the brain and cord, or a small amount of saliva, inoculated into the meninges of rabbits, cause characteristic lesions. This may be done when for any reason the brain examination is not satisfactory.

The incubation period is usually about six weeks. Rarely, the disease appears a few days, rarely a year, after the infection. The wound may heal nicely. At the end of the incubation period, the wound or its scar becomes inflamed and painful, and may suppurate. The patient becomes anxious and irritable and the tension of the laryngeal and pharyngeal muscles causes dyspnea, dysphagia and hoarseness or dysphonia. About a day after the beginning of these symptoms, the second or stage of excitement begins. Hyperesthesia is marked; a slight sound, especially of running water, a draft of cool air, or a ray of light may precipitate convulsions. These are tonic, rarely clonic, and may cause death from asphyxia. The dysphagia and hypersecretion of saliva cause frothing at the mouth. The convulsive action of the muscles of the jaws may cause clicking noises and the hoarseness of the voice, with dysphonia, may suggest barking or snapping, but attempts to imitate the barking or manner of a dog prove the absence of rabies, and suggest hysteria (lyssophobia, pseudohydrophobia, q. v.). During this stage the temperature may be normal or to 103° F. The pulse is irregular, and finally the spasms appear spontaneously. Suicidal attempts with or without melancholia, are frequent. After one to three days the spasms cease gradually, and the third, or paralytic stage appears. Unconsciousness supervenes, the heart gradually fails and death follows in six to twenty hours. Recovery from typical rabies has never been reported.

Treatment. Prompt and thorough cauterization of the wound with caustic potash or actual cautery is indicated. The Pasteur treatment must be begun early if at all. The patient should be sent to the nearest institute for treatment if this is to be given.

The wound should be kept open and drained for six weeks. After the disease appears darkness and quiet are necessary. Chloroform is needed for the spasms. The absolutely fatal prognosis, after the disease has manifested itself, should indicate the free use of every method possible to relieve the suffering. No cases are reported in osteopathic literature.

Prophylaxis. Dogs harbor and transmit several dangerous infections, besides rabies, and their existence should be permitted only under strict supervision. In country places, healthy dogs may be useful. Sick dogs are always dangerous, especially to children. There is no room for dogs in crowded places, and the sooner the sentimental petting of dogs is superseded by a saner sentiment in favor of cleanliness, the better for the human race. Squirrels, rats, and other rodents may have the disease in a mild form, and may transmit it to human beings or to dogs in the severe form. Nothing but the total extermination of these animals, especially in cities, should be considered.

The few dogs that are allowed to live should be muzzled when in cities or in the presence of strangers. Ownerless dogs should be humanely killed; in suspicious cases they should be kept under observation a few weeks before death.

TETANUS

(Lock-jaw; trismus; cephalic tetanus)

Tetanus is a specific, infectious disease, caused by the bacillus tetani and characterized by severe, persistent tonic spasms of the muscles, especially those of the jaw.

Etiology. The exciting cause is the bacillus tetani of Nicolaier, which usually gains entrance to the system through some small wound, especially a puncture wound, and produces a toxalbumin of extraordinary virulence which travels to the central nervous system along the motor nerves. The bacillus multiplies in the intestinal tract of the horse and retains vitality in the soil for many years.

The forms depend upon how affected and the part affected.

Idiopathic tetanus occurs when no open wound is discoverable.

Traumatic tetanus occurs when an open wound is found.

Tetanus neonatorum attacks newborn infants.

Lock-jaw or trismus affects the jaw alone.

In **Cephalic tetanus** the throat and face are affected.

Diagnosis. The onset is sudden with stiffness of the neck, tongue, and jaw. There are headache, gastric disturbance, and

languor. Opening the mouth and deglutition become difficult but not painful; the stiffness increases, extending to the spinal muscles, abdomen, and legs, which are finally held in a firm spasm. Orthotonos, opisthotonos, pleurothotonos, or emprosthotonos have occurred. The symptoms vary in degree and severity. The jaw may be firmly locked or may yield to forced extension. (Lock-jaw or trismus.) The muscles of the face may be involved so that the angle of the mouth is drawn out and the eyebrows are raised (risus sardonicus). Spasm of the pharynx and esophagus may occur, especially if there are injuries to the fifth cranial nerve.

Associated with these tonic convulsions is intense pain, especially if the chest muscles are involved. The paroxysm may be excited by any slight sensory impression, as a draught of air or the slamming of a door. The tension may be relieved so that the patient is able to walk around but relaxation is never complete and the patient walks as if his legs were wooden. The spasms vary in frequency from a few minutes to several hours apart, ceasing during sleep.

The fever is slight, or to 110° to 112° F. just before death; the pulse is small and frequent during a paroxysm; perspiration is excessive; the bowels are constipated and the urine is febrile. The mind is clear throughout.

Death usually occurs within four days from exhaustion. Chronic tetanus presents similar symptoms but less marked and develops more slowly.

The toxin appears to be excreted by the kidneys.

The exudate from the initial wound contains many bacilli.

Treatment. Free incision and thorough disinfection and cauterization of the wound is absolutely necessary and the wound must be kept open until the base heals. The patient is put into a quiet, darkened room with all sources of irritation excluded. Strong, thorough treatment of the cervical region is indicated. Deep, steady pressure of the nerve centers controlling the affected muscles will shorten the spasm. The hot or continuous neutral bath may be used. All the excretory organs should be kept active.

Liquid food only can be given. It may be necessary to resort to rectal or nasal feeding if the spasms are too much localized.

Anti-tetanic serum is on the market, but its use should not be attempted by the general practitioner. If it should be decided, in any case, to employ this method, only someone who has made especially careful study is able to secure the maximum of good with the minimum of danger.

Prognosis. The mortality in traumatic cases is 80%, in idiopathic, 50%. Fatal cases usually die within 6 days. Favorable features are: childhood, slight fever, localized spasms, and longer incubation period.

Prophylaxis. Every wound, especially of a puncture character, should be immediately cleansed and antiseptically dressed. Those inflicted around stables or from rusty nails must be opened thoroughly and kept open until all danger is past.

The increased use of automobiles instead of horses is an important factor in lowering the death rate from tetanus.

FOOT AND MOUTH DISEASE

(Epidemic stomatitis; aphthous fever)

Foot and mouth disease is an acute, specific, infectious disease of cattle, sheep and pigs, which may be communicated to man by the ingestion of dairy products from diseased cattle or by direct inoculation; characterized by a vesicular eruption of the membranes of the mouth and by constitutional symptoms. The exciting cause is unknown. The incubation period is from three to five days.

Diagnosis. The onset is marked by chilliness and fever, digestive disturbances, salivation and the appearance of a vesicular eruption upon the lips, inside of the cheeks, and the pharynx. In children, a miliary or pustular eruption appears upon the skin, especially of the hands.

In severe cases, hemorrhages may occur. The duration is about a week.

Treatment. The treatment is that of stomatitis. Recovery is to be expected in a few days to a few weeks, according to the sanitary conditions.

Prophylaxis. Isolation of human patients and diseased cattle and quarantine of their attendants are important. During an epidemic, all milk should be boiled before being used.

ACTINOMYCOSIS

Actinomycosis is a chronic infectious disease occurring among cattle and pigs and affecting man, due to the presence and multiplication of the streptothrix actinomyces. The fungus is common on various grains as oats, barley, etc. It may be taken in with the food or be inhaled with dust from grain.

In animals it causes the disease known as **"lumpy jaw."** In man, it is most liable to attack the lungs, intestines, or liver, as well as the jaw and neck but any organ may be involved. The skin is sometimes affected.

It leads to great connective tissue proliferation with the formation of nodular masses which may be mistaken for osteosarcoma. Ultimately, suppuration takes place and deep-seated abscesses are the result.

Diagnosis. The general features are irregular fever, depending largely upon the existence of suppuration and the location of the lesion.

Lumpy Jaw. There may be swelling of one side of the face, or enlargement of the jaw. The tongue may be involved, showing small nodular growths either primary or secondary to those of the jaw. An abscess forms which discharges the fungus in the pus.

Intestinal Actinomycosis. The symptoms are gastric disturbances, diarrhea, and localized pain or tenderness, with symptoms of pericecal abscess or appendicitis, perforative peritonitis, or hepatic abscess.

Pulmonary Actinomycosis is characterized by cough, fever, wasting, and a mucopurulent or fetid expectoration often containing the fungus. Irregular fever and offensive sputum, the physical signs of consolidation especially in the mammillary and axillary region and in the middle zone of the thorax may suggest tuberculosis. Actinomycotic abscesses form large cavities which may be diagnosed in life.

Lesions of other organs may be present with the pulmonary form as erosion of the vertebræ, necrosis of the ribs and sternum with nodular formation, subcutaneous abscesses and metastasis.

Cutaneous Actinomycosis is marked by a chronic ulceration resembling skin tuberculosis, with tumor growths which suppurate and leave open sores which may remain for years.

Cerebral Actinomycosis has the symptoms of brain tumor or abscess. The fungus may be found in the urine when the disease exists in the genito-urinary tract.

In the sputum, the fungus and small "sulphur" granules or thread-like particles of yellow color are found. Elastic fiber from the lung is never found. Pus containing the fungus may be discharged with the buccal secretion. The disease may affect the tonsil.

Treatment. Very little can be done after the disease has become established. Surgical evacuation of the pus when the abscess is localized and accessible, gives a fairly good prognosis. The treatment for pulmonary tuberculosis should be used in the pulmonary form. Sometimes the process may be kept very slow, and fairly comfortable existence prolonged for years.

Complete recovery is rare.

Prophylaxis. Persons caring for cattle should be very careful when they find one with "lumpy jaw" to see that it is treated and cured or else killed and the body deeply buried. When handling animals with this disease, they should use the utmost cleanliness. Chewing straws should be forbidden.

MILK SICKNESS

(Trembles)

Milk sickness is an infectious disease of cattle (trembles) communicable to man by the ingestion of the milk or flesh from the diseased animal, occurring in the new settlements of the Western states, and characterized by constitutional symptoms and a swollen and tremulous tongue.

Diagnosis. Prodromal malaise, headache, and anorexia are present. In a few days, a burning pain in the stomach, nausea, vomiting, excessive thirst, and obstinate constipation occur. The breath has a characteristic foul odor. The tongue is swollen and tremulous. In severe cases, there is restlessness, hebetude, coma or convulsions, with development of the typhoid state and ultimately a fatal result. Slight fever is usually present but may be absent. The duration is from three days to three or four weeks, averaging ten days.

Treatment. Full washings of the colon; the usual treatment for fever, and other symptomatic treatment are indicated.

Prognosis. Recovery is the rule but in grave acute cases death may occur in three days.

Prophylaxis. Cattle with trembles should be killed and the body buried or burned. The milk from the rest of the herd must be boiled, if used. Carefulness in caring for the sick animals, especially in thoroughly cleansing the hands, is necessary.

GLANDERS

(Farcy; malleus humidus; equinia)

Glanders is an acute infectious disease, occurring in horses, due to the bacillus mallei, and characterized by the formation of granulation-tissue nodules in the nostrils (glanders), or under the skin (farcy); sometimes occurring as an industrial disease in man, especially among grooms and stable-boys, and those caring for horses. It is caused by the discharges from an infected animal reaching an abrasion or a mucous surface. The incubation period is from three to five days.

Acute Glanders. There is redness and swelling of the nasal mucous membrane with burning and dryness, followed by the development of nodules which rapidly break down and discharge a fetid hemorrhagic or mucopus. Headache, painful deglutition, cough, fever, and prostration are later followed by the typhoid state and eventually terminate in death.

Twelve or fourteen days after the disease begins lumps arise just under the skin or in the muscles, and necrosing, discharge a bloody fluid containing the bacillus mallei.

Acute Farcy (glanders of the skin). The site of inoculation becomes inflamed, swollen and red. Neighboring inflamed lymphatics appear as small nodules, "farcy-buds." The constitutional disturbances include rigors and sharp fever. A local or general eruption appears; abscesses develop in the subcutaneous tissue, and muscles; the joints may suppurate and the internal organs become involved. This grave pyemia leads to death in the course of one to three weeks.

Chronic Glanders (or farcy). This form is characterized by the development of a local granuloma, which breaks down into an irregular ulcer with thickened edges and a foul discharge. The lymphatics also tend to ulcerate and the nasal mucosa may become affected. The disease may last for years but may take fatal, acute form at any time.

The **diagnosis** is difficult. It may be made by cultures from the discharge; by agglutination test, or by injection of some of the discharge into the peritoneal cavity of a guinea-pig.

Treatment. The indications are surgical attention, cleanliness of the nasal passages, and nutritious diet.

Prognosis. The acute form is fatal. The chronic form may recover with proper treatment.

Prophylaxis. Diseased horses should be killed and their bodies buried or burned, their stalls torn down, purified and entirely rebuilt. The use of mallein is used to detect glanders in animals.

ANTHRAX

(Charbon; malignant pustule; wool-sorter's disease; splenic fever; splenic apoplexy)

Anthrax is an acute specific infection due to the bacillus anthracis, essentially a disease of cattle and sheep but attacking man chiefly as an industrial disease, and characterized by a local or general type.

Butchers, tanners, wool-sorters, hair-combers, sometimes veterinary surgeons, and those who work in hides or who care for cattle and sheep are liable to infection. The bacilli may also be carried by flies.

The incubation period is one to six days. The mode of infection in man is through a wound or scratch on the skin, by the respiratory tract, or by the alimentary tract. The local form is found in two varieties, the malignant pustule and anthrax edema. The general form is named according to the organ attacked.

Malignant Pustule is due to skin inoculation, and occurs on exposed parts as the face, hands, neck, and lips. It begins with

prickling and burning, a small papule forms, becomes vesicular and surrounded by a dusky red indurated areola. The fluid of the vesicle passes quickly from clear to bloody and escapes, forming a dark scab at the summit. There may be a ring of vesicles around this eschar. It may then disappear or may extend, producing great induration and brawny edema. The lymphatic glands are swollen but there is little or no pain or distress, even when the case is severe. Prostration, sweats, splenic enlargement and other systemic disturbances may appear. The temperature is at first high but may afterwards be normal. Death may occur in three to five days or a slow recovery follow upon sloughing out of the eschar.

Anthrax Edema. The eschar and induration are absent, the constitutional symptoms are very grave; swelling is an extensive and spreading edema, beginning usually around the eyes. It is a pale red or yellowish swelling which may go on to gangrene. This form is much more fatal than the malignant pustule, the mortality being about 33%. The general form is rare in man.

Respiratory Anthrax (wool-sorter's disease). The primary lesion is usually in the trachea and the larger bronchi where there are patches of intense swelling of the mucous membrane with hemorrhages and ulcerations. Broncho-pneumonia, enlarged spleen and mediastinal glands are frequent. The disease begins with chill, fever to 103° F., headache, vomiting or diarrhea, and marked prostration. There are varying pulmonary symptoms—hurried breathing, great pain in the chest, and cyanosis. Delirium is common. Death usually occurs in three or four days. If the patient survives a week recovery may be expected.

Gastro-Intestinal Anthrax (mycosia intestinalis) gives rise to hemorrhagic lesions of the mucous membrane of the intestines, with enlarged mesenteric glands and spleen. Suggilations appear on the gums. There are symptoms of an intense poisoning—severe vomiting and diarrhea with possibly blood-streaked stools, and tumid abdomen. The pyrexia is slight and death is preceded by intense collapse in one to seven days. The bacillus anthracis is found in the blood, pus, exudate, serum, sputum, and elsewhere.

Treatment. The treatment is mainly surgical. The local lesion should be destroyed by caustic potash or the actual cautery; the swelling should be excised, if not too large. If large, crucial incisions are made and the parts cauterized with pure carbolic acid. The carbolic lotion should be injected into the surrounding tissues two to three times a day. The diet and other treatment depends upon the condition of each patient as found on examination.

Prognosis. If the pustule is promptly operated, recovery is the rule. Internal anthrax is usually fatal.

Prophylaxis. Prevent anthrax in animals by preventing the spread of infected material. Burn the bodies of dead infected animals unopened and under the supervision of the sanitary authorities. Those who work with animals should be taught the dangers of uncleanliness, and every provision made for their personal hygiene.

OTHER DISEASES

Nearly all the worms that infest the human body are the gift of animals to mankind. Tapeworms, trichina and others are taken into the human body with raw or improperly cooked meat or fish. Sheep or rabbits distribute the microscopic eggs of flukes or coccidia in water or over vegetables, with fecal material. People who drink the water or eat the vegetables without cooking, become the hosts of these worms. Horses, cats and dogs carry round worms, and other worms, very plentifully. The microscopic eggs of these worms are scattered around with fecal material and also with the dust and hairs which have been contaminated with fecal material. By unwashed hands and in other ways, and by flies, the fecal material bearing the eggs reaches human food, and the eggs develop in human bodies.

Other less common diseases are splenomegaly and Leishmaniasis, derived from dogs, camels, and rats, probably by the way of fleas; and Malta fever, given by the goat in infected milk.

Domestic animals, as well as mosquitoes, flies, rats, and other insects carry infection from place to place with celerity.

CHAPTER XLIX

DISEASES DUE TO AGENTS YET UNKNOWN

VARIOLA

(Smallpox)

Variola is an acute, specific, infectious, highly contagious, epidemic disease, characterized by lumbo-sacral pains, vomiting, an initial fever lasting from three to five days followed by characteristic eruption. The maturation of the pustular stage is accompanied by a secondary fever during the presence of which grave complications are prone to occur. The secondary fever may not appear.

Etiology. The disease is caused by one or more specific agents whose nature is unknown but which retain virulence for a long time. There is no period of the disease after invasion when it is not contagious although it is most virulent during the suppurative period. It is spread by fomites, contact with the pustular contents, scabs or scales of desquamating skin. Unlike most erythematous diseases, it attacks all ages, classes and conditions of life.

Smallpox attacks those who are apparently of robust physique, though doubtless lowered vitality is one factor in predisposing to the disease. It is especially those who are most robust who are most frequently exposed to the infection. It is also true that a robust and florid appearance by no means denotes heightened vitality. Moderate drinkers, so-called, have often this florid appearance, and they are especially subject to infection from smallpox. They usually suffer the disease in more virulent form than do non-drinkers. One attack usually confers immunity.

The incubation period is from eight to sixteen days, not often attended by recognizable symptoms. The predisposing factors are: debility from illness or poor nourishment, alcoholism, unhygienic surroundings, muscular lesions of the occipito-atlantal and atlanto-axoidal articulations and such other contractions of the neck muscles as narrow the thoracic inlet, or interfere with metabolism in any of its phases. Fear must also be mentioned as a cause.

Pathology. Granular and fatty degeneration occurs in the liver, spleen, kidneys, and heart. Infiltration is found in the adrenal glands and the testicle. During the papular stage, there is local hyperemia of the papillae, with interstitial exudation and colliquative necrosis of rete cells, so that a vesicle is formed, peculiar in that it is transversed by delicate bands of epithelial cells. This, with the fact that coagulation-necrosis occurs mainly in the center,

gives it the umbilicated or depressed appearance. The contents of the vesicle are plasma, fibrin, and cell detritus. Leucocytic invasion converts vesicle into pustule. This has a more globular, elevated appearance than the umbilicated vesicle. Pyogenic organisms are found in the pus. When the inflammation injures the corium, scars are apt to result; this occurs when the skin is scratched. The actinic light rays increase this danger.

Diagnosis. The stage of invasion lasts about three days. It is characterized by sudden onset with violent chills and shivering, agonizing pains in the back and legs; intense headache mostly frontal, a temperature rapidly reaching 102° to 104° F., full, strong and rapid pulse, 100 to 140, uncontrollable vomiting, pharyngitis, face red, eyes bright, coated tongue, anorexia, constipation, sleeplessness, delirium, often copious perspiration, and extreme prostration. An "initial exanthem" clearing within 24 to 48 hours appears. It is either hemorrhagic or erythematous. About the third day, the true eruption makes its appearance, first upon the forehead and in the scalp, then the rest of the face, the backs of wrists, trunk, arms, and lastly the legs, most abundant upon parts exposed to the atmosphere. With the appearance of the eruption all symptoms abate, the temperature falls, and the patient may feel quite comfortable. The eruption consists of coarse, red spots upon the body, like flea-bites, rapidly becoming within twenty-four hours slightly raised red papules, feeling hard and shotty to the touch, and each surrounded by a broad red inflammatory band, the areola. Usually by the sixth day the papules become converted into umbilicated vesicles, at first clear, then turbid. They are hard and indurated to the touch, and on the eighth or ninth day they become pustular. The areola becomes much darker, and the temperature rises to 103° to 105° F., pulse 110 to 120. The other symptoms all reappear with salivation and delirium. Marked edema of the skin renders the face unrecognizable. The pustules are painful, especially in places where the skin is thickened. The maturation lasts about three days, when the fever falls by lysis. If fatal, death usually takes place about the tenth day, preceded by feeble and more rapid pulse, marked delirium, subsultus, and sometimes diarrhea. About the eleventh day, dessication begins, the pustules begin to dry, forming dark scabs which are tightly adherent. The fever and other symptoms subside but itching becomes annoying. The odor from the pustular stage on is a peculiar greasy one.

After the rupture of large pustules the centers frequently dry and sink in, often in the shape of a Maltese cross. This is most typically seen upon the backs of the hands and is pathognomonic. Toward the end of the third week the scabs fall, leaving red glistening pits which disappear or change into deep white striated scars. The hair falls but may grow again.

Secondary toxic or septic rashes appear during the stage of decrustation, sometimes with mild fever. They may be either scarlatiniform, morbilliform or hemorrhagic. The skin immediately surrounding the drying pocks is often exempt, leaving an anemic halo. This rash lasts about three days, and fades or desquamates. With the development of the skin eruption, an exanthem appears upon the mucous membranes of the body cavities, developing into ulcers. This may develop before the dermal rash and be of diagnostic importance.

VARIETIES

Variola Vera is the discrete form in which symptoms are of moderate severity and the pocks are separated by healthy skin.

Variola Confluens is characterized by the early appearance of the eruption, the coalescence of the pustules, marked prostration, noisy delirium, stupor, high, irregular secondary fever, profuse salivation, and sometimes uncontrollable vomiting and diarrhea. Death is apt to occur about the tenth day. If recovery occurs, convalescence is tedious and disfiguring scars are common in the most favorable cases.

Abortive Type. The prodromal phenomena are mild. The eruption either fails to appear by the fourth day or only a few pocks go through the regular metamorphosis, or the development of the pocks ceases in the papular stage.

Malignant Smallpox. Of this there are three forms.

Variola Pustulosa Hemorrhagica (black smallpox) is characterized by hemorrhages into the pocks and upon the mucous membranes of the entire body. Collapse, cardiac weakness and death are usual. The mind remains clear and the patient is conscious of his danger.

Purpura Variolosa (variola purpurica). On first or second day the prodromal exanthem rapidly becomes hemorrhagic and does not disappear upon pressure with the finger. Severe angina, hemorrhages from the gums, lungs, stomach, uterus, bowels, and urinary tract follow. Death occurs about the fourth day, preceded by signs of collapse, which has manifested itself by a relatively low temperature even before the pustule appeared. Some few hemorrhagic pocks occasionally appear. The diagnosis of the condition is by history of exposure to smallpox and the characteristic prodromes.

Corymbose Variola is a rare but severe form in which the pocks are arranged in grape-like clusters.

Varioloid (modified or mitigated smallpox; variola benigna; variola modificata). Persons exposed to smallpox sometimes suf-

fer from varioloid instead. Persons who have had smallpox may suffer from varioloid at subsequent exposure to smallpox. Vaccination appears to initiate an attack, in persons peculiarly susceptible, or as the result of improperly performed vaccination. The lesions remain in the epidermis, the course of the eruption is shorter, the papules vesicate by the fifth day, the process of suppuration is abridged, decrustation occurs rapidly with little or no scarring, and all symptoms are milder. There are various modifications.

Variola sine Exanthemate or variola sine variolis has the usual symptoms but no eruption or a very few pocks.

Variola Verrucosa. The large solid conical papules with small vesicles at their apices rapidly desiccate and form crusts and finally disappear without scars. Variola miliaris has very small yellowish vesicles.

Variola Cornea (horn-pox) is known by the hard mahogany crusts.

Complications. During the secondary fever, there may be broncho-pneumonia, pleurisy, dysentery; hemorrhages of all kinds, ulcerative eye, ear, and laryngeal conditions, purulent arthritis, orchitis, gangrene when the swelling is great and subcutaneous abscesses form, often attacking the penis and scrotum; erysipelas attacking the face, and rarely nephritis. During convalescence, carbuncles, boils and other subcutaneous abscesses are very common. Disturbances of the peripheral nervous system as neuritis, peripheral paralyses especially of the palatal muscles, neuro-retinitis, and otitis media are less common. The **sequelæ** most common are boils and abscesses, deep pitting, otitis media, blindness, and permanent baldness.

The **urine** has the usual febrile changes. The white **blood** cells reach 10,000 to 20,000 or more. Lymphocytosis occurs during pustulation; the polymorphonuclear cells are decreased to 40%, sometimes 12%; myelocytes and irritation forms are found. During the febrile stage, there is a polycythemia followed by an anemia to 3,000,000 or less during the pustular stage. Regeneration is slow, lasting about fourteen days. Normoblasts are rare except in the hemorrhagic forms. Exudate taken from the pustule shows streptococci, staphylococci, and pseudodiphtheria bacilli.

Smallpox may be confused with a long list of diseases, including varicella, measles, cerebro-spinal meningitis, scarlet fever, pneumonia, syphilis, typhus fever, and septico-pyemia.

Treatment. The imperative demands of treatment are isolation, ventilation, cleanliness, and disinfection. When suspicious symptoms of smallpox are found, the proper authorities should be notified at once and the patient isolated. When the diagnosis is made, hair and beard should be cut very close.

The room should be well ventilated, the windows screened and slightly darkened by red curtains to exclude the ultra-violet rays of light. The temperature should be maintained at 65° F. All superfluous hangings, rugs, and furniture should be removed. The doorways may be protected by a sheet dampened with carbolic solution 1:60. The nurse must be of robust physique, preferably immune, and not afraid. Male nurses must have very short hair and no beard. Female nurses must have short hair or must wear a close cap. Absolute cleanliness is secured by plenty of baths, clean bed and personal linen, and careful nursing. The physician must put on a special suit with cap and gloves which he keeps in the house but not in the sick room.

Remove all bony and muscular lesions found and pay strict attention to the lower thoracic spine and ribs. No adjustment requiring difficult and painful technique is to be given after symptoms make their appearance. Reflex muscular contractions must be relieved as frequently as they recur. It is best to visit him from once to three times a day, treating the special symptoms as they arise.

"I have never yet seen the so-called 'fever of pustulation.' In every instance the fever has dropped when the eruption appeared, and has not recurred. This is probably due to the use of systemic antiseptics throughout the entire course of the disease. From the cases which I have had, I would say that osteopathic manipulation would be impossible. The eruptions are so numerous, and so sore, that it would be impossible to get the fingers on the flesh anywhere without interfering with them. The onset of the cases of small pox that have come under my observation, has been very much like typhoid fever, the slow pulse, step-ladder temperature, general aching, and malaise." —G. J. Conley.

Diet. During the period of vomiting, pellets of ice in the mouth are comfortable. Later barley or oatmeal water with lemon juice may be used. Plenty of water is a necessity. As the fever declines an easily digested and nutritious diet of milk, eggs, broths, beef juice or gruels may be given every three hours. During convalescence, a full, well-regulated, nutritious diet should be ordered.

The daily toilet consists in keeping the skin and the orifices of the body clean and soft. The nose is cleansed with glycerine, cold cream, or olive oil, which also keeps the crusts soft. The mouth and naso-pharynx may be cleansed with Dobell's solution, or any mild antiseptic. The eyes are washed with warm boric acid solution (gr. v to xx to the ounce), sterile water, or saline solution. Cold compresses applied over the eyelids assist in reducing the edema. A daily tepid sponge is necessary. Baths may be given of bichloride of mercury (1:20,000) or creolin (1:500). These assist in cleanliness and also aid in reducing the offensive odor.

Headache. Deep, steady digital pressure in the suboccipital fossa or at the eighth thoracic spine, the ice bag to the head or a mustard plaster at the back of the neck may relieve.

Vomiting. Thorough relaxation and adjustment in the great splanchnic and cervical areas, with deep, steady digital pressure in the occipital triangles or at the fourth and fifth dorsal vertebræ on the right side will usually control the condition.

Fever. The usual fever treatment of relaxing through the upper dorsal area, correction in the cervical region and deep, steady pressure in the upper cervical area are good. Warm sponging in lower grades of fever, the bath at 70° F., and the cold pack may be needed. If the temperature goes very high give a continuous cool colonic irrigation.

In **confluent cases,** the prolonged warm bath helps guard against septicemia, the pustules become softened and may be evacuated by gentle rubbing with gauze.

Pitting. Cold wet dressings of lint soaked in any comfortable, mildly antiseptic solution, or ice water and glycerine, are to be used on the face and hands to prevent pitting. Hot water dressings are more comfortable to some patients. It is better to protect the skin from the light, especially the ultra-violet rays. This must not lead to any lack of thorough ventilation, however. When the crusts are forming, keep them moist with vaseline, oil, glycerine, or carbolic acid in lanolin or vaseline.

Odor. The baths, the daily toilet, and the use of dusting powder or 5% iodoform powder, an open bottle of smelling salts or of weak ammonia, all are fairly good. Plenty of fresh air is best of all.

Cardiac Weakness. When the pulse is feeble and frequent, a general quieting treatment should be given, including relaxation of the cervical areas and the fourth and fifth dorsal segments. An ice bag in flannel directly over the heart may be used.

Diarrhea in children may be relieved by deep, steady pressure over the second lumbar vertebra. Enemas are useful.

Maniacal delirium is usually prevented by spinal extension, the prolonged warm bath and the cold pack, if given when signs of nervousness appear. Chloroform or morphia may be required in violent or suicidal cases.

Obstruction of the Larynx. This usually occurs from edema and may call for tracheotomy.

Bed-sores. If the patient becomes very much debilitated, he may become subject to bed-sores and abscesses even under the best of care. Placing him upon a water-bed or in a continued warm bath is indicated.

Convalescence is not to be considered complete until the skin is perfectly smooth and free from any trace of a crust.

Prognosis. The prognosis depends upon the age of the patient; complications; and the environment from which the patient comes, as well as the nursing. In varioloid the prognosis is recovery; in the discrete variety, good; in the confluent, grave, 50% die; in the malignant types, all perish. In those under five years and over forty the prognosis is grave. A filthy environment predisposes to complications. Recurrences seldom occur; a second attack is usually of the varioloid type.

Prophylaxis. The usual rules for the public care of smallpox are: rigid isolation, vaccination, disinfection of the skin and all fomites, and final fumigation. Quarantine of a suspected individual is sixteen days after exposure. Isolation is continued until the disappearance of every trace of eruption.

VACCINIA

(Vaccination; cow-pox)

Vaccinia is the reaction which follows inoculation with the vaccine virus or virus of cowpox. It is supposed to furnish variably effective immunity against smallpox. Many think it best to vaccinate in infancy after the sixth month, at the seventh or eighth year, at puberty, and thereafter at intervals depending on the prevalence of smallpox. The virus is prepared under sterile conditions from carefully selected and tested calves. It is put up under aseptic conditions in hermetically sealed capillary tubes or, in the old style, on ivory points.

Technic. The area selected is usually the left arm at a point above the insertion of the deltoid muscle. The leg is preferable in children or even in adults, as it is easier cared for. The point of election here is over the junction of the two heads of the gastrocnemius muscle.

The skin should be carefully washed with soap and water and then with alcohol.

Sterilize a needle or lancet and scratch an area about a quarter of an inch in diameter at the selected site, being careful not to produce bleeding but merely an oozing of pinkish lymph. Deposit the drop of virus upon the abraded area, rub in with the side of the needle, and let dry. Dress with a sterile gauze bandage wrapped several times around the arm or leg. Prevent the bandage from slipping by strips of adhesive plaster.

Diagnosis. If successful, on the third day a small red papule is seen, becoming an umbilicated vesicle on the sixth day and a pustule upon the eighth. The adjacent tissues are red and infiltrated. Tenderness and itching are present. The areola begins to fade by the tenth day. The pustule becomes a mahogany-brown crust by the fourteenth day and is detached by the twenty-third day. The resulting scar is circular, depressed, foveated, radiated,

and paler than the surrounding skin. This process is accompanied by varying symptoms. Slight fever, malaise, restlessness, glandular enlargement and other constitutional disturbances are often present. The younger the child after one month the less the disturbance. The axillary or the inguinal glands are often swollen.

Complications. Not all cases are so benign. Infection with pyogenic organisms results in abscesses, erysipelas, or tetanus, and various eruptions. Otitis media may leave deafness.

During the first three days, erythema, urticaria, vesicular and bullous eruptions, and invaccinated erysipelas may be found.

After the third day the commonest complications are urticaria, lichen urticarius, erythema multiforme, or accidental erysipelas.

About the end of the first week there may be generalized vaccinia, impetigo, vaccinal ulceration, glandular abscess, septic infections, or gangrene.

After involution of the pocks invaccinated disease, for example Hodgkin's disease, syphilis or tuberculosis, may appear, especially when human virus has been used or the technique faulty.

General Vaccinia (vaccinal eruptive fever; vaccinola). The eruption appears usually from the fourth to tenth day after vaccination, the lesions appear in crops successively, pass through the four stages of smallpox, and usually subside by the twenty-first day. The lesions may be few or numerous and appear upon any portion of the body. Fever may be absent or present but is usually proportionate to the extent of the eruption and the associated complications.

Sore Arm. The areola about the fully developed vesicle may spread over a considerable portion or the whole of the arm. It may give rise to a diffuse cellulitis. The arm is red, swollen, hot, and painful and there is apt to be some associated systemic disturbance. By traumatism to the vesicle, an ulcer may form. The areola may become hemorrhagic. Localized gangrene may occur.

Treatment. After vaccinating, the patient is told to return in seven days. The dressings are then removed and if successful, a pearl-like vesicle will be present. If it is broken by accident or by rubbing of the gauze, the free portions of the dressing are cut away and the adherent part left. A new gauze is applied in either case. In five or six days more, the dressing should again be changed and this changing continued at intervals until the crust falls, usually from the third to the fourth week after vaccination.

If no vesicle forms by the tenth or twelfth day the vaccination is unsuccessful.

Prognosis. Uneventful recovery is expected. Pitting from the generalized vaccinia; various constitutional diseases; paralyses and

other maiming disabilities sometimes occur. It is not considered dangerous to life.

Sequelæ are usually prevented by using a pure vaccine and the use of aseptic methods and antiseptic care afterward, though these do occur sometimes under the best of care.

VARICELLA

(Chicken-pox)

Varicella is an acute, contagious, eruptive, mildly febrile affection, occurring principally among children; characterized by a moderate fever, the appearance on the first day of a maculo-vesicular rash which is repeated in successive crops, and the desiccation and falling of the crusts in three to five days.

Chicken-pox is an epidemic disease which spreads rapidly, is caused by an unknown organism, affects children under ten years the most frequently although adults may be attacked, is highly contagious but not inoculable, and confers immunity. It bears no relation to variola. The incubation period is from seven to seventeen days, usually fourteen days. Among predisposing causes we find the muscles in front of the neck and behind the jaw contracted, and muscular and bony lesions of the clavicle and ribs.

Diagnosis. The onset is sudden, with fretfulness, moderate fever, 99° to 101° F. persisting during the course of the disease, thirst, anorexia, constipation, sometimes vomiting, and furred tongue. The eruption comes out within twenty-four hours and may be the first symptom noticed or perhaps the child had been somewhat feverish and restless.

The **eruption** consists at first of hyperemic macules, then papular rose-colored spots, not hard, and rapidly converted into raised, flattened, ovoid, pin-head to pea-sized vesicles containing a fluid at first watery then pearly. They appear on the chest, neck, face, scalp, and then trunk and limbs in the order given, being most abundant upon the back. They number anywhere from eight to several hundred and are usually widely scattered. These vesicles are not umbilicated but some may have a slightly depressed center, are not loculated, are discrete, and appear in successive crops which require from three to six days to complete. The fresh roseolas are found between the drying ones so that by the fifth day one may find all stages of the eruption in a single case. There may be an efflorescence upon the mucous membrane of the oral cavity and of the pharynx causing slightly difficult deglutition. Sometimes a scarlatinoid rash precedes the true eruption. The itching is more or less intense. The vesicles always dry up, form yellowish spots of "dew drop" appearance, and a brownish crust which drops off leaving a slightly reddened, sometimes depressed

spot. Desiccation usually occurs by the third to fifth day although it may be present on the first or second.

Pitting may occur if the vesicles are scratched. Distinct umbilication is rare and pustulation is still more rare. Muscular tension of the cervical muscles, especially those in the front and around the angle of the inferior maxillary, clavicles bound down, and disturbed relations of the ribs are often found. Few complications occur. Severe itching may lead to scratching, scars or even ulceration. Gangrene around the vesicles (varicella grangrenosa) occurs in debilitated children, those tuberculous and congenital syphilitics. It is apt to be fatal. Slight enlargement of the lymph glands of the pharynx may persist. Furunculosis is not common except among those in very unhygienic surroundings. Varicella bullosa, nephritis and occasionally otitis media and bronchial affections may occur.

Treatment. The younger children should be put to bed until the crusts have formed. The older children may be allowed around the room. A light general treatment makes the little patient more comfortable and prevents complications.

"Be very careful and very thorough in your neck adjustments. Loosen the atlas and axis and draw forward the inferior maxillary from its pressure upon the vessels and nerves back of its angle. Draw the hyoid bone forward and secure good circulation of blood throughout the entire cervical region."—A. T. Still.

Give a bland easily digested diet. Overcome the constipation by splanchnic and abdominal manipulation and by laxative diet. During active eruption, do not use tub baths. Keep the nails short and very clean. Daily tepid sponging with either plain water or boric acid solution answers both as an antiseptic wash and bathing.

After the daily sponge and several times during the day as needed to control the itching, anoint with a 10% boric acid ointment or carbolized vaseline. When the scratching cannot be controlled the hands may be tied in muslin bags.

The ultra-violet rays of light seem to be especially irritating. The parts of the body exposed to light are more deeply scarred, as a rule. Hence, the use of a dull red light is often advised, in order to diminish the scar formation, as in smallpox.

The **prognosis** is invariably favorable unless serious complications arise which is seldom. Recurrences very rarely occur.

Prophylaxis. The child should be considered in quarantine for three weeks or until the skin is wholly clean.

SCARLET FEVER

(Scarlatina)

Scarlet fever is an acute, specific, contagious, infectious, erythematous disease of childhood, characterized by sudden onset

with vomiting, sore throat, punctiform eruption in the roof of the mouth, high fever, very frequent pulse, followed in twelve to twenty-four hours by a bright red punctiform rash, by a desquamation often in large flakes, by variable degrees of severity, and by the large number of complications and sequelæ, especially nephritis and inflammation of the serous membranes.

Etiology. The disease is due to an unknown agent. Bacteria and protozoa have been described by various bacteriologists. The virus is very resistant to heat, light, and drying. It is transmitted from child to child through unclean habits of eating and drinking. It first attacks the tonsils, later the other tissues, and leaves the skin and the mucous membranes with broken immunity to various other infections. The disease is epidemic, rarely sporadic. Contagion is carried by direct contact, fomites and by milk. The secretions of the respiratory tract, the desquamated epithelium, and articles used by the patient are infectious. Predisposing factors are: lesions both bony and muscular interfering with vitality, the autumn and winter, age between six months and ten years, puerperal women and open wounds.

Pathology. No specific lesions are found. No trace of the rash shows after death except in the hemorrhagic form. The anatomical changes in cases coming to autopsy are those of simple inflammation, follicular tonsillitis, or diphtheroid angina. Streptococci are abundantly found in the glands and foci of suppuration. The lymph glands and lymphoid tissue may show hyperplasia.

Diagnosis. Invasion is sudden, with usually vomiting, sometimes convulsions in the younger children; sore throat; intense fever, 103° F. or higher, on the first day; pulse 120 to 150 per minute, unduly rapid for the temperature; respirations increased; the glands at the angle of the jaws swollen; insomnia, and nocturnal delirium which disappears as the rash comes out. The skin and muscles of the back are hypersensitive to touch and to extremes of heat and cold.

At the end of the first day or a little later the rash appears. It is composed of scattered scarlet red points on a deep subcuticular flush, appearing first upon the neck and chest, spreading rapidly so that by the evening of the second day it has invaded the entire skin except for a circle around the eyes, nose and chin and is most intense upon the trunk and the flexor surfaces. The throat shows reddening of the pharynx and uvula, the tonsils enlarged and with often creamy-white patches covering the mouths of the follicles. The temperature persists and may even reach 104° to 105° F. Itching and burning are annoying at times. There may be considerable swelling of the skin.

The eruption reaches its height between the second and third days when it has a vivid scarlet hue unlike any other eruption, becoming darker each day until it may be bluish-red, when it

gradually fades and desquamation begins. During this time papules are often seen. Also sudaminal vesicles may develop so that the skin is covered with small yellowish vesicles upon the red background (scarlatina miliaris). A punctiform eruption in the arm-pits, groins, or roof of the mouth is considered positive proof of scarlet fever. There may be fine punctiform hemorrhages.

By the seventh or eighth day, the rash has disappeared together with the fever. The skin looks somewhat stained, is a little rough like "goose skin," and gradually the upper layers begin to separate, first about the neck and chest, and coming off in large lamellæ or flakes. This may repeat in individual areas. Casts of the fingers or toes may be shed. This process lasts from four to eight weeks.

The tongue at first is red at the tip and margins with a grayish-yellow or whitish fur in the center through which are often seen the swollen red papillæ, the "strawberry tongue." The "fur" desquamates upon the third or fourth day leaving a surface intensely red with markedly raised, swollen papillæ, the "raspberry tongue or cat tongue," lasting nearly a full week. The breath has a heavy sweet odor. There are several types of this disease.

Mild and abortive form (scarlatina sine eruptione). In this the rash may be scarcely perceptible, while the fever, sore throat, and strawberry tongue are present. Desquamation may occur and serious nephritis follow.

The **malignant forms** include **fulminant** toxic or atactic variety, in which there is onset with great severity, high fever 107° to 108° F., and extreme restlessness, headache, and delirium. Convulsions may occur, sometimes vomiting and diarrhea; initial delirium gives place to coma; dyspnea may be urgent; pulse very rapid and feeble, and death occur in twenty-four to thirty-six hours from the intense toxemia.

In the **hemorrhagic** variety there are hemorrhages into the skin, beginning with scattered petechiæ, becoming more extensive and ultimately involving the whole skin.

Severe epistaxis and hematuria are common. Death may take place on the second or third day. This is more common in enfeebled children although it may attack adults in apparently full health.

Anginose variety (scarlatina anginosa). The throat symptoms appear early and progress rapidly. Temperature to 105° to 107° F., cyanosis, diarrhea, rapid weak irregular pulse, and stupor occur. The fauces and tonsils are covered with a thick membranous exudate which may extend to the posterior wall of the pharynx, forward into the mouth, upward into the nasal chambers, and may occasionally reach the trachea and bronchi. The Eustachian tube and the middle ear are usually involved. The glands of the neck

rapidly enlarge and become the seat of brawny induration, and the inflammation extends beyond their limits. Necrosis occurs in the tissues of the throat, fetor is extreme, the constitutional symptoms are great and the child dies from toxemia. If he does not succumb, extensive abscess formation in the tissues of the neck takes place with sloughing and danger of hemorrhage from the opening of a large artery.

The **spinal examination** usually shows muscular contractions throughout the entire length but these are more prominent at the upper dorsal, in and around the eleventh and twelfth dorsal and in the upper cervical areas. Bony subluxations may be found anywhere.

The physical examination has no special features. The spleen may be palpable but the liver is not often enlarged.

The **blood pressure** rises at first, thereafter it follows the pulse and temperature. After the seventh or eighth day, it may be below normal. Cases with albuminuria show hypertension and slowing of the heart action. With the subsidence of the kidney irritation the pulse rate is increased and the blood pressure returns to normal.

The **urine** shows the ordinary febrile character, being scanty and high colored. Slight albuminuria is rather common after the stage of eruption, even a few tube casts may be present without any serious irritation of the kidney. The examination should be made daily.

Blood. The red cells are moderately reduced to 3,000,000 or 4,000,000 per cmm. during convalescence. There may be some poikilocytosis and normoblasts are occasionally seen. Leucocytosis is early, 15,000 to 30,000 per cmm., falling with the decline of the fever usually by the fourteenth day, but may persist for weeks after the temperature is normal. The count runs roughly parallel to the temperature. Over 40,000 leucocytes per cmm. are of bad prognostic omen. Polymorphonuclear cells are increased to 80% to 90%; early returning to normal in favorable cases.

Eosinophilia is present in all but malignant cases. It reaches its maximum two or three days after the rash appears and returns to normal after the leucocytosis has disappeared. The early presence of eosinophilia excludes septic conditions. When these cells are absent in scarlet fever, myelocytes are to be found.

The symptom complex which is pathognomonic of scarlet fever is the changed condition of the tongue, the angina, the exanthem, and the fever. The diagnosis is not usually difficult, but may be confounded with the following conditions: acute exfoliating dermatitis, measles, rötheln, septicemia, diphtheria or antitoxin erythema, acute follicular (lacunar) tonsillitis, and the drug eruptions.

Treatment. Complete isolation with a competent nurse, a light, quiet, thoroughly ventilated room of a constant temperature (if

possible two rooms, one for day and the other for night; situated upon an upper floor), and suitable means for thorough disinfection of all articles used in the sick-room are essential elements of treatment. The child should wear its customary night apparel. The bed clothing should not be too heavy.

Thorough osteopathic treatment should be given along the spinal region from the atlas to the sacrum inclusive, to keep the muscles well relaxed, giving special attention to the relationship between the atlas and the occiput, the cervical vertebræ and the deep cervical muscles, especially those muscles at the angle of the inferior maxillary and those at the base of the occiput, also much attention to the renal splanchnics.

Adjust the clavicles by bringing fairly well forward to relieve any irritation that might be started in that area. Direct treatment to the abdomen should usually be given at each visit besides the work in the splanchnic area to keep the bowels, kidneys and liver active. Careful, deep work over the ureters is beneficial.

Diet. Water must be freely given. Pellets of ice to hold in the mouth are a comfort during the fever. Fruit juices, especially orange, are best during the fever. For infants, cut down their feedings to half, making the milk very thin with water or gruel. After defervescence, carefully increase to a light diet using sparingly of nitrogenous foods except milk. After four weeks in a usual case, gradually return to the ordinary food. This is a good time to make corrections in the ordinary diet if any are needed.

The **bowels** must be kept regulated. An enema is usually indicated after the onset of the disease. During the time when food is permitted, it should be of a laxative quality. A tepid sponge should be given at least once daily. The nose may be cleansed by instillation by means of a medicine dropper, using normal salt solution.

If the **throat symptoms** are mild, a gargle of normal salt solution is enough for cleanliness of the membrane. If the throat symptoms are too severe to permit the use of the gargle, or if the patient is too small to be taught to gargle or to wash the throat, irrigation may be employed.

The **teeth** should be thoroughly and carefully brushed twice each day. The **skin** must be kept comfortable. "Using carbolized water (1:40) to sponge the surface, followed by the application of cocoa butter, will tend to reduce the fever by soothing the cutaneous burning and irritation; and later when desquamation occurs limits the source of infection by preventing the diffusion of what would be dry scales in the air."—McConnell and Teall.

During **desquamation** after bathing the child should be thoroughly rubbed and then the oily application used. Besides the cocoa butter, cold cream (nonmedicated), liquid albolene, or the

like may be used. Olive oil and vaseline are usually irritating at this stage.

A **temperature** above 102° can usually be lowered by steady, deep pressure applied in the suboccipital region for a few minutes, then followed by relaxation of the back muscles from the first to seventh dorsal, by raising and spreading the ribs in that area especially the fifth and sixth, and attention to the fifth lumbar region. When the fever is rapidly rising but the child is not delirious a tub bath may be given. The cold pack may be used when the patient has pronounced delirium and nervous symptoms. The ice-cap is useful and may be used constantly in high fever.

Severe sore throat is usually relieved by the treatment given and the throat toilet. Treatment around the hyoid bone to relax the muscles and to correct maladjustments is needed. With the first sign of a swollen gland, begin treatment by crowding the tissues toward the gland but never working upon the gland itself. This secures drainage and relief unless malignant pyogenic organisms are present.

If pain is felt in the **ear,** attention must be given immediately. Upper cervical treatment consisting of correction of any deviation of the atlas or other vertebræ, relaxing the deep muscles at the angle of the jaw and relieving any impingements at the upper thoracic region must be thoroughly employed. If the pain is not bad, the nurse may be directed to use a drop of warm glycerine or oil in the external auditory canal. If there is reason to suspect the existence of surgical complications, an ear specialist should be consulted. The condition of the drum membrane should be examined every day. If the drum is bulging, deeply congested and the landmarks indistinct, paracentesis should be performed.

The **heart** should be examined daily. Vigorous treatment through the thoracic region is indicated, if cardiac symptoms appear, and the patient kept quiet and in bed.

If **arthritis** occurs the affected joint must be wrapped in flannel or in cotton wool, and the treatment given under Acute Rheumatism administered. If albuminuria increases, the condition of the kidneys must receive prompt attention. Look for lesions around the tenth to twelfth dorsal vertebræ or the ribs attached thereto, correct deviations, and keep tissues constantly relaxed.

After the temperature has been normal for ten days, the patient may be allowed to get up. For at least three weeks great care should be exercised to prevent exposure to cold or to other infections. Renal complications are most apt to occur during convalescence.

The patient must be seen from once to three times a day according to the severity of the case.

Prognosis. Epidemics differ in severity and in mortality. The mortality is greater in hospitals, among the poorer classes, and in children under one year of age. Very high fever, early mental disturbances, hemorrhages, intense diphtheroid angina, laryngeal obstruction and nephritis cloud the prognosis. Most cases recover.

Recurrences seldom occur. Sequelæ are frequent. These include nephritis, deafness due to otitis, cardiac lesions, rhinorrhea, otorrhea, and throat troubles. These should not occur in cases properly handled.

Prophylaxis. The child is infective for from eight to thirteen weeks, usually until after desquamation is complete. If left with any rhinorrhea, otorrhea, or throat trouble he is especially infectious, though he may seem in perfect health. The period of quarantine for suspected cases is ten days after exposure; if it develops the period of isolation is six weeks.

Complications. Patients who receive correct osteopathic treatment from the onset of the disease rarely suffer from complications or sequelæ. The following may occur:

Nephritis is most common in the second and third week of illness, rarely the fourth, but may develop as late as the sixth. The nephritis may be hemorrhagic, in which the urine is suppressed or there may be a very small amount of bloody fluid laden with albumin and tube casts; constant vomiting and convulsions follow and the child dies with symptoms of acute uremia.

In less severe cases there may be a puffy appearance of eyelids, slight edema of the feet, urine diminished in quantity, smoky, containing albumin and tube casts. The kidney symptoms dominate, dropsy persists and there may be effusion into the serous sacs. The condition may become chronic, the patient may succumb to uremia; in the majority of cases recovery takes place.

In the milder cases the urine contains albumin and a few tube casts, very rarely blood, and edema is slight or transient. Convalescence is scarcely interrupted, or serious symptoms supervene, or edema disappears and the child improves but remains pale and with a slight trace of albumin in urine for months, then recovery or chronic nephritis.

Severe scarlatinal pyemia may be attended with suppuration of one or more joints and is usually fatal.

Polyarthritis or true scarlatinal rheumatism occurs during the second or third week. Many joints are attacked especially the small joints of the hands. There may be inflammation of the tendon sheaths, heart may be involved, and the outlook is usually good for recovery.

Malignant endocarditis occurs in the severe septic cases, sometimes with a purulent pericarditis, and is fatal.

Severe toxic myocarditis is sometimes present, leading to acute dilatation and sudden death. Simple endocarditis is not uncommon and may give no symptoms. Signs of slight enlargement may persist after convalescence and valvular lesion may result. Acute bronchitis and pneumonia are not common. Empyema is an insidious and serious complication.

Otitis media is a common and serious complication owing to the extension of the inflammation through the Eustachian tubes. It is the most frequent cause of deafness in children. Extension from the middle ear to the labyrinth rapidly produces deafness, to the mastoid cells, suppurative mastoiditis. From the necrosis following middle ear disease there may be paralysis of the facial nerve, thrombosis of the lateral sinus, meningitis, and abscess of the brain.

The swelling of the neck may extend beyond the lymph nodes. This usually subsides within a few weeks, the most extreme enlargement gradually disappearing.

Acute phlegmonous inflammation (angina ludovici) may occur with widespread destruction of tissue. Vessels may be eroded and fatal hemorrhage ensue.

The **nervous** complications include chorea, sudden convulsions followed by hemiplegia, and mental symptoms as mania and melancholia. Progressive paralysis of the limbs with wasting, may simulate infantile paralysis.

Rare complications are: edema of the eyelids without nephritis, symmetrical gangrene, enteritis, noma, and perforation of the soft palate. The fever may persist after the eruption disappears and the child remain in a septic state (scarlatinal typhoid).

Relapses are rare. Scarlatina may coexist with almost any of the other acute infections. It lowers the resistance of the body to disease and is often followed by other acute infections or by tuberculosis.

MEASLES

(Morbilli, rubeola)

Measles is an acute, infectious, erythematous, contagious disease, characterized by an incubation period of about ten days; by catarrhal symptoms of the naso-bronchial mucous membranes; by a typical temperature curve; by the presence of Koplik's buccal spots; and by a papular eruption appearing upon the fourth day and terminating in a branny desquamation.

Etiology. The infectious agent has not been found. The disease occurs chiefly among children; is epidemic and rarely sporadic; is transmitted by the respiratory secretions, fomites and

through a third person; and is extremely infectious during the incubation and the eruption.

The incubation period is from seven to eighteen days. Cervical and upper dorsal lesions involving the vasomotors to the mucous membranes of the respiratory tract and to the lymphatics draining it are predisposing factors.

Diagnosis. Known exposure to infection or the presence of an epidemic are the only history factors.

The stage of invasion begins with chilliness or a decided chill, fever rapidly rising to 101° to 104° F. on the first day; pulse rate increasing with the fever to 120 to 140 times per minute; headache, muscular soreness, intense nasal, pharyngeal and laryngeal catarrh; photophobia with red watery eyes; sneezing and a croupy cough; hoarse voice, sometimes nausea and vomiting. Small, irregular spots of a bright red color, each having a bluish-white center, upon the buccal mucous membranes within the lips and upon the gums are called Koplik's spots. They appear upon the first day and fade upon the appearance of the dermal eruption, and are considered pathognomonic of measles. On the second or third day, the fever remits to normal or subfebrile. On the fourth day, the temperature rises again, increasing as the rash develops, to 104° or 105° F. and reaching its maximum on the sixth day when it falls by crisis; on the seventh or eighth day the temperature is normal. The eruption consists of small, dark red macules with minute papules in the center of each somewhat raised, arranged in crescentic groups, velvety to the touch, which may become confluent, and disappear on pressure.

They appear at the hair-line of the forehead and spread over the chest, trunk, and entire body. The eruption is attended by itching and burning, and develops completely in twelve to thirty-six hours, while the catarrhal symptoms still persist. About the ninth day the rash begins to fade, first from the face and neck, leaving a yellowish discoloration, and disappears entirely in a bran-like desquamation, which usually lasts several days to a week.

There are several varieties.

Measles without eruption (morbilli sine exanthemati, morbilli sine morbillis) is a form in which the symptoms are typical up to the eruptive stage but this fails to appear and convalescence is established.

Black, hemorrhagic or malignant measles is severe and fatal. The onset is usually violent with high fever and nervous symptoms. The eruption is bluish or purplish and fails to disappear upon pressure.

Other hemorrhages in the form of petechiæ, ecchymoses, or bleeding from mucous surfaces may occur. The patient is rapidly

exhausted, the pulse frequent and thready, the skin pale and cold and death ensues.

Adynamic measles is a serious type in which the symptoms are grave from the outset but without hemorrhages and the typhoid status is early present.

The most common complication is bronchopneumonia. Others are capillary bronchitis, otitis media, severe stomatitis and gastro-enteritis.

The spinal examination shows cervical and upper dorsal contractions with lesions of the upper four ribs and clavicle. "During all examinations of such patients, I have found muscular contractions at the union of neck with the head."—A. T. Still.

The physical examination shows the buccal spots, a tongue coated with somewhat turgescent papilli, and the eruption.

The blood pressure is usually low. The urine shows no special changes except those of fever in general.

The blood shows leucopenia before and during the eruption, the eosinophiles are normal or usually diminished during the febrile stage or they may disappear altogether. The red cells are practically normal. The decided diminution of eosinophiles is of considerable diagnostic value. If there is increased inflammation of the mucous surfaces the fibrin content is increased. During convalescence the lymphocytes and large mononuclears are increased.

Treatment. As soon as a susceptible individual is exposed to infection, he should be isolated, watched and whatever is found improper in diet, hygiene, or structural relationships corrected.

On invasion, the patient should be put to bed in an isolated, well-ventilated room of constant temperature from which all hangings, rugs, and curtains have been removed. The windows should be shaded especially to prevent thin rays of light, and when artificial lights are necessary, these must be shaded.

The treatment includes the relaxation of the contracted muscles, adjustment of bony lesions as found, raising the ribs and increasing the mobility of the thorax and especially of the dorsal region. Manipulations which are very painful or difficult should be avoided during the progress of the disease. Dr. Still says, "The arms must be raised and the axillary regions freed at once and kept so."

"Isolation is of great importance, and should be carried out in every case. I would like to emphasize the importance of isolating practically all cases of coryza in localities where are cases of measles. If not measles, no harm is done; if the case is measles, then you have likely prevented the communication of the disease to several possible victims. . . . The room should be well ventilated with a temperature of about 70 degrees, avoiding direct draft on the patient: The diet should be that of any acute febrile condition, and I strongly advise during the height of the fever that nothing but water be admin-

istered. . . . Two or three treatments a day during acute stage have given me the best results in these cases. The treatment is confined almost exclusively to a light stimulation of the upper dorsal region with the patient lying on the back, and also a gentle but thorough relaxation of the cervical region with considerable traction of same. . . . During the fever, warm or even slightly cool sponge baths are beneficial, but no other bathing advised."—J. Ferguson.

In the beginning it is usually necessary to give an enema. The bowels must be kept open during the course of the disease by diet and manipulation. The diet during the attack should be light, suited to the age of the patient. Plenty of water is urgently required. The temperature is usually controlled by the treatment, but if it stays over 104° F. for an hour or longer and the physician cannot reach the patient, direct the nurse to give a tepid sponge bath of ten to twenty minutes' duration and repeat at intervals of two to three hours.

For the irritation of the skin, a tepid bath with water at 100° F. given twice daily should be used and the patient dried carefully and an application of cold cream, liquid albolene, or olive oil made over the entire body. The cough is best relieved by thorough treatment of the anterior and posterior thoracic regions and any subluxations of the upper ribs or clavicle corrected. Keeping the air of the room moist with vapor is agreeable to the congested mucous surfaces. During the waking hours, the eyes should be generously bathed every hour or two with a three per cent solution of boric acid using cotton which is destroyed after use. Dark glasses in a well-ventilated room are better than unaired darkness.

The mouth and nose must be carefully cleansed at regular intervals and the cloths burned. An otoscopic examination should be made every second day until the case is discharged. The condition of the lungs must be examined daily.

If the rash is slow in appearing and the child is very uncomfortable from the high fever (104° to 105°) a hot bath (105° to 110° F.) for three to five minutes will often bring out the rash and relieve the urgent symptoms.

During convalescence, the patient must be guarded against cold. Recovery is hastened by such treatment as is indicated by the conditions found on examination, and should be given two or three times each week.

Prognosis. Nearly all uncomplicated cases recover. In the hemorrhagic and adynamic forms, the majority succumb. One attack usually confers immunity. Second attacks probably never occur.

Sequelæ are frequent but are prevented by careful nursing during convalescence.

"In and of itself measles is usually not particularly serious, but the after-effects are so far-reaching and so serious that students of the history of med-

icine rank measles third among infectious diseases for causing death. During recovery from measles the patient stands in special danger from pneumonia, and pneumonia following measles is more dangerous than uncomplicated pneumonia. There is a considerable length of time during which he is particularly susceptible to tubercular infection. This is so often insidious, and its evidences are so obscure, that by the time the disease has fully developed one may have forgotten the mild attack of measles which really paved the way for the serious malady."—C. A. Whiting.

Prophylaxis. During an epidemic, all children should be guarded from exposure. If possible, each child should be examined in order to see that no lesions or other predisposing causes of lowered resistance are present. At any rate, when measles makes its appearance in any family, or when children are supposed to have been exposed, the treatment should be begun at once. There is no doubt, in the minds of those who have cared for children in this way, that the percentage of infection following exposure is lessened by beginning treatment before the onset of the disease; and also that when infection is found to be unavoidable, the disease runs a much milder course than is the case when the osteopathic physician is sent for only after the attack has made a pronounced beginning. Children known to be exposed should be at once isolated. After all catarrhal symptoms have disappeared the patient may be disinfected and removed to another room and the sick room thoroughly disinfected. The quarantine period is sixteen days unless modified by the health authorities.

To sum up the prophylactic measures, isolation, disinfection of fomites, skin and secretions from the nose and mouth, and the final disinfection of the sick room are necessary.

RUBELLA

(German measles; Rötheln; epidemic roseola; French measles; false or hybrid measles, or hybrid scarlatina)

Rubella is an acute, specific, infectious, contagious, eruptive fever; attended by mild fever, suffused eyes; mild cough; sore throat, but no catarrh; a macular, rose-red eruption on the throat, accompanied by swelling of the cervical lymphatic glands and by a rose-colored eruption of irregular size and shape appearing on the first day of the disease. There is hypersensitiveness in the suboccipital regions, and also in the midthoracic. Muscular contractions are not marked and chiefly affect the hyoid, mandibular and cervical groups.

The infectious agent is unknown, is carried by fomites, attacks children especially, and occurs in epidemics or sporadic cases. Children recovering from other infectious diseases are particularly susceptible. The incubation period is from five to twenty-one days and is without symptoms. One attack confers immunity.

Diagnosis. The onset is sudden with chilliness, mild fever 100° to 101° F.; slight headache; mild sore throat; pains in the back and legs; little or no coryza; swollen cervical and post-auricular glands, macular rose-red eruption on the throat constantly present; and the eruption of a dermal rash appearing upon the first, or rarely, on the fourth day. This consists of round or oval, slightly raised, pale pinkish-red pinhead to lentil-sized macules. These are discrete at first and afterwards may coalesce, especially on parts where pressure is exerted. It shows first upon the face, follows a wave-like progression extending to the body and limbs while fading upon the parts first affected and lasting in one region from a few hours to a half day. It extends over the whole body within twenty-four hours.

There is usually more or less itching. The rash may be the first symptom of disease noticed. After persisting for two or three days, the fever and eruption gradually subside together. The skin is slightly discolored, and slight desquamation is found.

Two varieties are described—the scarletiniform resembles scarlet fever but is much milder; the morbilliform resembles measles.

The complications and sequelæ are rare; bronchitis, pneumonia, otitis media, and very rarely a false membrane on the throat may be found.

Treatment. The patient should be kept in a properly heated and ventilated room, and in bed for about two days. The main treatment is to the lesions found, if any, with careful treatment of the cervical lymphatics, general relaxation of muscles and freeing of the excretory channels. Such measures are usually sufficient.

The diet should be reduced and regulated according to the age of the patient and the severity of the symptoms. Free bowel movement must be secured. Tepid sponging once daily followed by an oily application on the itching parts is agreeable. Heat may be applied to the enlarged posterior cervical glands with relief.

Prognosis. Recovery is the rule. Relapses are more severe than the primary attack. They are prevented by good nursing. In unhygienic surroundings or if the child is delicate the outlook is more serious. Recurrences do not occur and sequelæ are absent.

Prophylaxis. The patient should be isolated for ten days after the appearance of the rash.

Like measles, this disease seems to lower the general resistance to other infections. For this reason, children recovering from this mild disease should receive especial care to protect them from other infectious diseases, and also to protect them from cold. Even more than under ordinary conditions, such children should be given plenty of fresh air, good food and suitable exercises.

EPIDEMIC PAROTITIS

(Epidemic parotiditis; mumps)

Epidemic parotitis is an acute, specific, infectious, contagious inflammation of the parotid and other salivary glands, characterized by pain, swelling, fever of a moderate degree and disordered function. There is a special liability to orchitis or to mastitis.

Etiology. The infecting agent probably enters through the excretory duct producing a catarrhal inflammation which rapidly extends into the interstitial tissues of the glands rather than the parenchymatous tissue. Congestion, swelling and infiltration with serous fluid take place with more or less infiltration of the adjacent connective tissues. The process rarely goes on to suppuration.

The disease occurs both epidemically and sporadically, with an incubation period of two to three weeks and on recovery usually conferring immunity although a second and a third attack have been known. Children between the ages of five and sixteen years are the most liable to the infection. Upper cervical lesions especially those of the atlas and axis are predisposing factors.

Diagnosis. Except in sporadic cases, there is usually a history of the disease in the family or in the neighborhood.

The invasion is rather sudden, with moderate fever usually below 102° F. with its attendant phenomena, dull pain and tension in front of the ear on one side, and stiffness at the angle of the inferior maxillary. Swelling appears which gradually increases until within forty-eight hours the whole cheek and neck is greatly enlarged, the face distorted and the lobe of the ear displaced by the infiltration beneath the sternomastoid muscle. If only one gland is involved at first, the second usually follows in a day or so although often in a lesser degree. The patient is unable to open his mouth without pain; acids or rarely sweets produce spasm of the jaw muscles; speech and even deglutition are difficult. The saliva is sometimes increased and at other times diminished. Salivation is frequent. The breath is foul and the tongue is furred. The submaxillary and the sublingual glands may enlarge also.

There is usually no change in the color of the skin covering the gland. The mucous membranes of the cheek and pharynx are reddened and there may be a slight angina. The tumor feels hard and doughy, not fluctuant, and is somewhat sensitive to pressure.

The spine often shows subluxations in the cervical region especially of the atlas and axis, perhaps upper rib lesions also. If the submaxillary gland is involved, the second and third dorsal vertebræ with their ribs may show maladjustment. These lesions may be secondary.

The symptoms persist for six to fourteen days, when the swelling diminishes and the patient rapidly recovers his health and strength.

If the temperature does not fall when the parotid symptoms decline some other involvement may be looked for—orchitis in the male, and mastitis, ovaritis or vaginitis in the female. This does not occur before puberty. When orchitis does occur, it is unilateral, increases for three or four days, and is usually followed by resolution. In severe cases atrophy may occur.

Treatment. The patient must be kept in a well-lighted, well-ventilated, evenly warmed room, away from other children; in bed if the temperature indicates.

The correction of all bony lesions found is indicated, paying particular attention to the cervical region especially the atlas and axis. The second and third dorsal vertebræ need attention from the influence of those nerves on the submaxillary glands. Upper rib lesions must be searched for also.

A liquid diet of fruit juices with water, thin gruels, milk and plenty of water is indicated.

The bowels and other excretory organs must be kept freely active. Tepid sponging allays the fever restlessness and keeps the skin active. The treatment making the patient the most comfortable is the relaxation of the deep muscles of the neck and shoulders and those under the angle of the jaw as well as relaxing contracted muscles wherever found. The very gentle relaxing of the tissues around the gland itself by crowding them toward the gland assists in relieving the tension by securing a better venous and lymphatic drainage.

Inhibition of the upper posterior cervical nerves by a few minutes' steady pressure assists in lowering the temperature. Raising and spreading the ribs from the second to the seventh gives relief.

Hot applications to the swollen gland are very soothing and may consist of hot fomentations, a hot salt bag, cotton wadding covered with oiled silk, or a hot water bottle.

A mild antiseptic mouth wash keeps the mouth in good condition.

Orchitis should not occur if the boy is kept warm and in bed. If it does, the best treatment is rest, support and protection with cotton wool, cold applications and the correction of any bony or muscular lesions affecting the pelvic viscera. Good drainage is best secured by support and manipulation.

Mastitis may occur, especially in girls nearing puberty. Rib lesions have been found present, and were considered responsible in a few cases. The treatment should include the correction of such lesions if this can be done without irritation to the inflamed

glands; the manipulation of neighboring tissues, with very gentle crowding of the normal tissue toward the inflamed glands, without exerting any pressure upon the gland itself, is usually helpful and comfortable. Free tissues back to axillary lymphatics.

Prognosis. The outlook for recovery is favorable. The disease usually confers immunity.

If the child has been kept clean and warm and had the proper care there should be no complications nor sequelæ. In the rare fatal cases, meningitis is the usual cause of death.

Rarely after very severe cases, permanent deafness has resulted from otitis media or interna. Sometimes a nonpurulent arthritis results. Chronic hypertrophy has been known. All of these cases were probably due to either an increased virulence or to bad hygiene.

Under osteopathic care the duration of the swelling, fever and pain has been markedly diminished.

Prophylaxis. Isolation, disinfection of the secretions of the upper air passages and a quarantine of twenty-four days is necessary.

Children should not be allowed to be exposed to this, nor to other contagious diseases. Each attack of any contagion is that much of sickness that ought to be avoided. It is not only the sickness itself that is to be avoided, but also the diminished vitality which follows recovery, and also the increased susceptibility to other, perhaps more serious, diseases that is produced by almost if not all of the ordinary "children's diseases."

GLANDULAR FEVER

Glandular fever is an infectious, sometimes epidemic disease of children, characterized by swelling and tenderness of the cervical lymphatics accompanied by high fever, and slight angina of the throat.

Etiology. Children between 7 months and 13 years, usually between 5 and 8 years, are predisposed. Rarely adults are affected.

Diagnosis. The onset is abrupt with pain in moving the head and neck, perhaps with nausea and vomiting and abdominal pain, temperature 101° to 103° F. of short duration, anginal symptoms are slight. On the second or third day, the characteristic tender glandular swellings appear, the carotid glands most frequently, the postcervical, next, axillary and inguinal, and occasionally the tracheo-bronchial and mesenteric glands; the size varies from that of a pea to that of a goose egg. The nodes are painful to the touch but the skin covering them is not involved. The subcutaneous tissues of the neck may be somewhat edematous and there may be a little difficulty in swallowing. The swellings per-

sist for from ten days to three weeks. Complications are rare but suppuration has occurred, otitis media, retropharyngeal abscess and hemorrhagic nephritis also occur rarely. The liver and spleen may be enlarged.

The **treatment** for infections in general must be modified to suit conditions as found. Usually it is best to avoid local manipulation until the glands have become free from fever and pain. Careful and vigorous treatment for increasing the mobility of the lower thoracic spinal column, raising the lower ribs, and such treatment for liver, spleen, kidneys and bowels as may be indicated on examination should be given. Very careful relief of tension of the tissues of the neck is sometimes indicated.

During the fever, the appetite is diminished. Fruit juices may be given freely; liquid foods may be given if the child becomes hungry. The usual methods of lowering the fever may be employed. The child should not be permitted to lie upon his back, nor to remain too long in any one position. Excitement must be avoided, in order to prevent the tendency, occasionally found, for cerebral symptoms to appear.

Prognosis. Recovery is to be expected, with no sequelæ.

CHAPTER L

TROPICAL DISEASES

BERI-BERI

(Epidemic neuritis)

Beri-beri is an endemic and epidemic form of multiple neuritis of unknown origin, occurring in tropical and subtropical countries and characterized by paralysis and dropsy.

The disease is almost certainly due to a lack of vitamins in the food. In Japan and India, an exclusive diet of polished rice may be responsible; in other countries, other foods deficient in vitamins make the exclusive diet. Predisposing causes are the countries of Japan, Malay Archipelago, Burma, and Brazil; seaports of other countries where ships from these countries call; overcrowding, warmth, moisture and insanitary surroundings.

Inflammatory and degenerative changes are found in the axis cylinders and medullary sheaths of the peripheral nerves. In acute cases, the phrenic and vagus nerves suffer. Wasting, degeneration of muscular fibers, both voluntary and cardiac are present. In the "wet" form, edema and dropsy of the body cavities occur.

Rudimentary types are those in which paresis and paresthesia are present, dropsy is slight or absent, cardiac symptoms are trifling. The attacks may persist for months and recur with each warm season.

The acute pernicious or cardiac type is marked by symptoms of acute heart failure and ends in death, sometimes in a few hours or usually in a few weeks.

Epidemic dropsy is an affection endemic in India, resembling beri-beri closely and distinguished by fever, and a multiform eruption upon the face, body and limbs.

Treatment. Attention to the diet is important. Nitrogenous foods and the raw green vegetables should be freely given. Certain extracts from yeast contain the vitamins in a good form for immediate use.

Prognosis. Recovery is dependent upon the form of the disease and the celerity with which dietetic and sanitary conditions are corrected.

ACUTE FEBRILE ICTERUS

(Weil's disease; infectious jaundice; Feidler's disease)

Acute febrile icterus is a disease of Egypt, the tropics, and other climates in hot weather, of unknown origin, occurring spo-

radically and endemically; and characterized clinically by sudden onset with chill, remittent fever which tends to decline by lysis after a week or two, gastric symptoms, diarrhea, muscular pains and headache. On the third or fourth day a jaundice of varying intensity develops with prominent nervous symptoms and emaciation; delirium and coma in grave cases, with epistaxis, hematuria, and albuminuria.

It is most common in butchers, and in those who work in foul water or in sewage. Bacillus proteus vulgaris may be the infectious agent. (See also page 528.)

Treatment. The treatment must be chiefly symptomatic. Improved sanitary and dietetic conditions are important. Free drinking of pure water, with nutritious diet after convalescence is established promotes return of strength. Treatment to secure good circulation through the liver and intestinal tract is indicated.

Prognosis. Recovery is to be expected in about a month with a slow convalescence.

TROPICAL SLOUGHING PHAGEDENA

This is a disease of unknown origin which is marked by the appearance of a blister upon an extremity, which ruptures after a few hours, exposing a gray area of superficial gangrene tending to spread at the margins, the floor of which is of a dirty yellow color, and the odor extremely offensive; the systemic disturbance is slight. After a variable period, usually a week, the slough separates and heals without much damage to the deeper tissues.

SPRUE

(Psilosis)

Sprue is a tropical disease, and is found in this country in those who have been for some time resident in the tropics, especially in India, Japan, or China. It is a chronic or remitting inflammation of the intestine, probably microbic or parasitic, characterized by irregular bowel action, and the passage of copious, pale drab stools, yeasty and of sickly odor. Ulcerative stomatitis and anal sores are frequent. Constitutional weakness, irritability of temper, and loss of memory are common symptoms.

The mucous membrane of the intestines shows catarrhal, ulcerative and cirrhotic changes in varying severity.

No cases have been reported under osteopathic care. The treatment ordinarily recommended is hygienic and dietetic—rest, the milk diet, and freedom from nervous disturbances give the best results. The prognosis is doubtful.

MADURA FOOT

(Mycetoma; fungus foot of India; Pièd de Cochin)

Madura foot occurs throughout the tropics, endemic in India, and lately in Panama. It is caused by one or several of eleven or more varieties of streptothrix and related fungi. These enter the foot, rarely other parts, through an abrasion. Small round painless nodular swelling appears on the plantar or dorsal surface of the foot. After some months, these gradually

soften, leaving crater-like openings from which an oily, seropurulent material is discharged containing pinkish granular bodies (pale madura) or black granules like gunpowder (melanoid madura). Other nodules form on the skin and break down, while the deeper structures undergo degenerative changes until finally the diseased part becomes badly deformed, and the limb above wastes away, while the foot doubles in size and loses its natural contour. Systemic symptoms, except those due to a long-continued suppuration, are lacking.

Treatment. Amputation is the only treatment. Good shoes and cleanliness are the best preventives.

AINHUM

Ainhum (Dactylolysis spontanea) is an endemic disease of India, marked clinically by a very slow, painless, spontaneous amputation of one or more toes at the plantar fold, the little toe being the most frequently affected. Constitutional symptoms are absent. The disease lasts one to ten years.

GOUNDON

Goundon or big-nose is an African disease affecting mainly negro children and young adults, ushered in with headaches, hard symmetrical tumors slowly developing on the upper part of the nose, with fever and a purulent nasal discharge. After a few months, all constitutional symptoms subside but the tumors are permanent.

MILIARY FEVER

(Sweating sickness)

Miliary fever is an infectious disease occurring in epidemics, mainly in France and Italy, of unknown cause, and characterized by moderate fever, very profuse sweating, tenderness and sense of oppression in the epigastrium, on the third or fourth day the eruption of small, reddish macules in the center of which a vesicle appears, these followed by a scaly desquamation. The eruption is usually most profuse upon the neck and trunk.

In severe cases high fever, delirium, hemorrhage and extreme prostration or collapse may terminate in death.

Treatment. The treatment is that of acute infections. (q. v.)

YAWS

(Frambœsia tropica)

Yaws is a chronic infectious tropical disease caused by the spirocheta pertensis (treponema pertenue). It is highly contagious through skin abrasions or wounds, has an incubation period of two weeks to two months, and is characterized clinically by the formation of peculiar somewhat raspberry-like granulomata. There is a week or so of prodromal malaise and sometimes fever, followed by the appearance of the eruption which at first consists of minute, itchy, subcutaneous papules which rapidly increase in size and protrude through the skin. The apex becomes yellowish and necrotic and later necrotic points may be seen around it. A

yellowish offensive oozing occurs which drying forms the crust. After a week the crust falls and healing takes place or ulceration occurs. The lesions are painless and occur in successive crops, thus making the disease last for months or years.

Treatment. The infectious organism greatly resembles that of syphilis, and the skin lesions bear certain resemblances to skin syphilis; the treatment employed for syphilis of the skin should be tried. The Wassermann reaction is positive, and the usual medical treatment is salvarsan.

Prognosis. Recovery usually occurs, after weeks or months of successive crops of the lesions. Children may die; older persons who are weakened, either by this or another disease, may die from exhaustion or mild intercurrent disease.

Prophylaxis. Isolation of patients is impossible in many tropical countries. Cleanliness must be constantly maintained scrupulously by those who travel in countries, or who are associated with persons newly arrived from the countries, in which the disease exists.

Gangosa is an ulceration of the palate, later involving the bones and cartilages of the nose; less often the eyes are also destroyed. The deformity is great; death is not expected. The disease lasts from several months to three years. Wassermann is positive; the usual medical treatment is that of syphilis (salvarsan), and there is some reason for considering the disease a tertiary stage of yaws.

TROPICAL DYSENTERY

(Bacillary dysentery)

Bacillary dysentery is an intestinal disease, usually acute, caused by the bacillus dysenteriæ, and marked by an inflammation of the colon, fever, and other general symptoms.

Etiology. The exciting causes are the dysentery group of bacilli, including the Flexner-Harris group, the bacillus dysenteriæ of Shiga and the bacillus Y of Hiss and Russell. The predisposing causes are hot weather and defective sanitation, especially in camps. The infection is conveyed by feces, soiled clothing, flies, and by contaminated soil and water. Convalescents may act as "carriers" of the disease.

Diagnosis. The incubation period is from two to eight days. In the acute form the onset is usually sudden or a previous slight diarrhea may have been present. There are frequent or incessant calls to stool with pain in abdomen, griping (tormina) and tenesmus. The stools are small, composed of a slimy mucus which within twenty-four hours becomes blood-stained. The passage of

a stool gives no relief; straining continues, and in grave cases from 50 to 200 stools in twenty-four hours occur. The constitutional reaction is marked by a slight or moderate fever 103° to 104° F., pulse small and frequent, great thirst, tongue dirty, white-furred; dizziness, dry skin, and the patient seriously ill within forty-eight hours. In milder cases, the urgency of the symptoms abates, the stools lessen, temperature falls, and within two or three weeks the patient is convalescent. In the graver cases, the patient may die of exhaustion, or the condition may rapidly assume a low and typhoid state, or death may result from pyemia or perforation. In fatal cases death usually occurs on the third or fourth days. The sub-acute or chronic form lasts weeks or years, the patient becoming much emaciated and having three to five stools in twenty-four hours, partly fecal, much mixed with mucus, occasionally with blood, and sometimes appearing like "frog's spawn." The appetite is poor, the tongue red and glazed, the anemia and emaciation progressive, and the patient has a shrunken and cachectic appearance. The spleen is not enlarged.

The complications include peritonitis, pleurisy, pericarditis, endocarditis, arthritis, rarely pyemia, anemia, and dropsy. Malaria and bacillary dysentery may coexist. Persistent dyspepsia and irritability of the bowels may follow.

The blood of a patient infected with an organism of the Flexner-Harris type will agglutinate a pure culture of the organism in a dilution of 1:1000 to 1500. In the case of the Shiga bacillus, agglutination is less complete.

A lesion, which may be either primary or secondary, is usually found at the third lumbar and should be immediately corrected. This will often subdue the pain and tenesmus. Careful relaxation of the sacral muscles followed by deep steady pressure over the third and fourth sacral foramina will give some relief. Hot fomentations may be used over the abdomen. The patient must stay in bed and be very quiet. The diet must be fluid at first, consisting of milk, egg-albumen, barley water, and chicken broth, etc. During the chronic form, the diet must suit the case, mainly liquids or semi-solid.

Prophylaxis. The stools should be disinfected as soon as voided. Good sanitation prevents the disease.

DENGUE

(Break-bone, neuralgic, dandy, or broken-wing fever)

Dengue is an acute, epidemic, infectious, febrile disease of tropical and subtropical regions, attended by two febrile paroxysms, the first characterized by high fever, severe and shifting pains in the muscles and joints and an erythematous rash, the second

paroxysm by milder fever, intense itching, polymorphous rash and disproportionate debility.

Dengue occurs sporadically, epidemically and pandemically, attacking persons of all ages and classes. Epidemics spread with great rapidity and suddenness. The agent is communicated by inoculation of infected blood or by bites of mosquitoes of varieties Culex fagitans and Stegomyia fasciata. The organism is not definitely known. The incubation period is from two to five days.

There are no characteristic morbid changes and it is rarely fatal.

Diagnosis. The symptoms set in abruptly with chilliness, intense headache, backache, severe pains in a single joint often extending rapidly to all the joints and bones and shifting from one to another; soreness at the seat of pain, particularly if in the head or eyeballs; temperature gradually rising to 103° to 105° F., even to 106° to 107° F., accompanied by slight nocturnal delirium; pulse rapid and full, respirations quickened; suffused bloated face with injected conjunctivæ; sore throat, thickly coated tongue; anorexia, marked thirst, nausea, vomiting and constipation, and a general erythematous rash. The painful joints may be red and swollen, or without much redness or swelling. After one to four days, the rash and fever subside, leaving the patient prostrated and stiff. After a remission of two to four days, there is a sudden milder return of fever, more pains, intense itching and a macular, rubeolar or vesicular rash, appearing first upon the palms and spreading over the arms, face, trunk, and lower limbs. This rash remains about two days, when it slowly fades and desquamates. The other symptoms disappear within eight days of the onset, but the patient is left in a state of mental and physical prostration disproportionate to the severity of the primary attack. The pains, especially those of the smaller joints, may persist for a long time so that the gait of a convalescent is stiff and affected.

The chief complications are insomnia, convulsions in children, and hemorrhages from mucous surfaces.

Sequelæ are few although atrophy of the muscles has occurred.

The spinal examination shows the cervical and lumbar regions to be more affected on the second day, while the lower dorsal seems to be worse on the third.

Treatment. Put the patient to bed in a suitable room protected from mosquitoes. Early treatment is important. Vigorous treatment of the sub-occipital, upper and lower dorsal and lower lumbar regions controls the large vascular areas of the lungs, the splanchnic region, and the lower limbs. The diet should consist of liquids and much water, preferably hot during the fever, or of splinters of ice in the mouth. During convalescence, the diet should be carefully regulated and nutritious.

The bowels must be kept active with as little disturbance as possible on account of the muscular pain. The high fever is best controlled by inhibition of the posterior cervical areas, tepid sponging and by ice-cap to the head. The pain is alleviated by correction of parts impinging on nerve tissues and by strong inhibition. A short hot bath or a continuous warm bath may give great relief. The entire spinal structure must be watched during convalescence when the object is to secure the best supply of blood to every part of the body through good food, plenty of fresh air, and unimpeded nerve supply.

Prognosis. The prognosis is favorable for recovery. Relapses are common even after two weeks from onset, hence the most careful nursing is necessary.

The disease does not confer immunity. The best preventive is to kill the mosquitoes in the territory affected. The rare sequelæ are prevented by carefulness on the part of physician, nurse and patient.

MALTA FEVER

(Mediterranean fever; rock fever; Neapolitan fever; undulant fever)

Malta fever is an acute, endemic fever of the south of Europe, characterized by an irregular course, undulatory pyrexial relapses, profuse sweats, rheumatic pains, and an enlarged spleen.

The exciting cause is the micrococcus melitensis. The predisposing factors are lesions of the skin and disturbed circulation through the intestinal tract. Youthful males are most often affected. The disease is especially frequent at Malta and Gibraltar. The goats of the district are largely infected and their milk contains the organism.

Diagnosis. Incubation is from six to ten days. There is a marked prodromal period with chilliness, lassitude, and general malaise, then a gradual rise in temperature to 104° F. or over, frequently remittent. Simultaneously, enlargement of the spleen and drenching sweats are accompanied by rheumatic and neuralgic pains, and constipation. There may be a slight cough and rales at the bases of the lungs. This stage may last from one to three weeks. The first period of apyrexia lasts a few days usually, and is succeeded by a **relapse** of several weeks. Another remission comes on longer than the first to be again followed by a relapse. The sweats continue and the patient becomes very weak. The main complications are arthritis, orchitis, and neuralgia.

Blood. Blood serum of patients affected by Malta fever shows agglutinating properties with a pure culture of the micrococcus melitensis, even upon marked dilution. There is leucopenia.

Treatment. The treatment is generally that of typhoid fever. The symptoms are to be treated as they occur. A thorough spinal treatment with correction of any subluxated vertebræ or other lesions will materially lessen the number of relapses.

Prognosis. The outlook is favorable for recovery. The mortality is about two per cent. The rare malignant cases usually succumb.

Prophylaxis. Do not drink goat's milk when traveling in Mediterranean countries. Goats brought to this country should be free from disease.

YELLOW FEVER

(Yellow jack; bilious malignant fever; typhus icterode; sailor's fever; black vomit)

Yellow fever is an acute, specific, infectious fever, of a limited geographical distribution; characterized by jaundice, albuminuria, and a tendency to hemorrhages, particularly from the stomach.

Etiology. The disease is caused by a specific poison, the microorganism of which is unknown. The intermediate host of this unknown organism is the mosquito, Stegomyia fasciata, which communicates the poison by being inoculated with the blood or serum of an infected person in the first three days of the disease, not later. From ten to twelve days are required for incubation in the mosquito before its bite transmits infection, and from four to five days more after the bite before the symptoms develop in man.

The predisposing causes are a tropical climate, the warm months, tropical Atlantic seaports, and filthy insanitary urban conditions. One attack confers immunity as long as the subject remains in the infected section. Frost stops the epidemic.

Bony lesions affecting the liver and renal areas and the vagi are probably predisposing causes and are constant in affected persons.

Pathology. There is dissolution of the red blood cells, granular degeneration and areas of necrosis in the viscera, and general glandular involvement. The liver shows size about normal, color pale yellow with hemorrhagic spots, cells atrophied, with fatty degeneration. The kidney is in a state of glomerulonephritis, is much engorged, with cells full of fatty globules.

The stomach mucosa is injected and ecchymosed, coated internally with altered blood. "Black vomit" is found.

Diagnosis. The disease is ushered in either by a prodromal period with malaise, headache, and anorexia, or suddenly by chill, high fever, 104° to 106° F., with pains in the head, limbs, and back. The full and strong pulse, rapid at first, but later slowing with a steady or rising temperature, is characteristic. The tongue is pointed, red at the tip and edges, and furred in the middle. The stomach is irritable, and there may be simple vomiting. Albuminuria may be present upon the first day. The patients are restless,

anxious and extremely prostrated. There is constipation and a characteristic odor.

This stage lasts from one to four days. Slight jaundice or delirium may appear. The fever remits to 100° to 99° F., and symptoms abate. Crisis or a short lysis and recovery follow, or after a few hours the third stage appears. The symptoms return in an aggravated form followed by jaundice of a lemon yellow to dark orange brown, black vomit, at first watery, but later mixed with altered blood and like coffee grounds; highly albuminous scanty urine, or suppression; slowing pulse with a rising temperature; hemorrhages from mucous surfaces, epistaxis, hemorrhage from the bowel, metrorrhagia (pregnant women abort); collapse, shrunken features, cold surface, irregular respiration and sometimes death, the mind remaining clear to the end. Recovery may occur even after black vomit has appeared. The mental aspect is a peculiar alertness with unmistakable evidences of fear, even after the most serious symptoms have appeared.

The red blood cells are approximately normal; hemoglobin from 75 to 50 per cent; hemoglobinemia is recorded; leucocytosis may be present.

Treatment. Put the patient in a clean room, screened and well ventilated. Kill all the mosquitoes within it. The room and everything in it must be absolutely clean.

Thorough work upon the whole spine is necessary. Correct lesions if possible before the third stage begins. Specific lesions have been found at the eighth dorsal and second lumbar vertebræ. Headache is treated by deep steady pressure to the occipital nerves and by the ice bag to the head. Irritability of the stomach is relieved by the general treatment and by the use of ice in the mouth. The patient must have all the water he can drink without causing vomiting. Keep the skin, kidneys, and bowels active by direct treatment and by baths. The fever is treated as usual, by deep steady pressure in the occipital region, and in the lower dorsal area. Sponging and cool baths may be used. Suppression of the urine is treated by work over the kidneys, to the renal splanchnics, and by hot baths and packs. Enterocylsis is useful in uremia. During the period of depression, the heart must be carefully noted and the measures used to prevent any complication or failure. Especial attention must be paid to the third dorsal and to the occipito-atlantoid articulation.

During the acute stage the patient cannot take food. Water or ice is to be given freely. As soon as convalescence begins, milk diluted with lime water or peptonized milk may be slowly begun at regular intervals and given in small quantities. Gradually increase until the patient is taking a normal diet.

Prognosis. The disease seldom lasts more than a week. Unfavorable symptoms are high fever, collapse, black vomit, and suppression of the urine. Favorable indications are moderate fever, slight jaundice, ample flow of urine, and freedom from hemorrhages. Alcoholics and those exposed to hardships are apt to die.

Prophylaxis. The spread of the disease must be prevented by screening the apartments of the infected and the healthy and by screening the cisterns, and draining swamps or covering them with petroleum. Those who work in a fever district should at least spend the nights away from town, preferably at some height above the sea-level.

Quarantine is fourteen days after exposure or recovery.

CHOLERA

(Epidemic cholera; Asiatic cholera; malignant cholera; spasmodic cholera; cholera infectiosa)

Cholera is an acute, specific, infectious disease, endemic in India, epidemic elsewhere, characterized by violent vomiting, purging of peculiar "rice-water" stools, severe muscular cramps, and a condition of prostration followed by collapse and death or a reaction subsequently developing into the typhoid state, or recovery.

The exciting cause is the comma bacillus of Koch (cholera vibriones or spirillum), and its toxalbumin. It is feebly contagious, mainly by the stools. The bacillus may be conveyed by infected water, milk, vegetables washed in contaminated water, or flies.

Predisposing causes are uncleanliness, gastric and intestinal catarrh, the eating of unripe fruits and alcoholic drinks. One attack does not afford protection against another. Incubation is from three to five days.

Diagnosis. Symptoms differ in different cases and different epidemics. The **stage of invasion** may last from a few hours to a week. The disease begins with chilliness, excessive thirst, white coated tongue, unpleasant taste in the mouth, slight abdominal pain, weakness and diarrhea. From three to twelve copious, watery, fecal, yellow, alkaline stools are passed during the day, easily voided with force and only slight pain. The stools rapidly become whey-like, grayish-yellow and flocculent. Occasionally an erythematous rash is present.

During the **stage of prostration** or evacuative stage the temperature is subnormal and pulse weak. The stools rapidly increase in number, and are voided with rushing force. These consist of a quart or two of grayish or whitish "rice-water" fluid, accompanied by forcible vomiting first of the contents of the stomach with more or less bilious matter and afterward of the peculiar "rice-water"

fluid. The thirst is intense. Muscular cramps, most severe in the calves of the legs, occur in all parts of the body. This stage lasts from two to sixteen hours. The **stage of collapse** or algid stage follows. The stools, vomiting, and cramps continue. The appearance of the patient becomes frightful: the eyes are sunken, and surrounded by black rings; nose pinched and pointed; cheeks hollow, lips blue (facies cholerica); the surface is cold and moist, the skin of the hands and fingers has a sodden appearance. The temperature rapidly falls to even 78° F. beneath tongue, while the rectal is 102° F. or more. The pulse becomes small and compressible, 100 to 120, barely perceptible at the wrist, and the heart beats scarcely recognizable. The voice is weak and husky, sepulchral (vox cholerica).

Later the purging usually ceases but vomiting may continue. The tongue and breath are icy. The mind is clear but most patients are apathetic. The urine is markedly diminished and albuminous. Complete suppression, coma and death may follow within a few hours. This algid state or cholera asphyxia usually terminates in death in three or not more than twenty-four hours, but may be followed by the **stage of reaction.** This lasts a few hours, during which the temperature gradually rises, the pulse becomes fuller and stronger, countenance brighter, the stools more fecal, thirst lessens, and increasing urine is a good prognostic sign. The patient either enters upon a slow convalescence of several weeks or the typhoid state develops, prolonging recovery for several weeks or postponing death (cholera typhoid).

Infectious complications may arise as pneumonia, enteritis, recurrence of severe diarrhea or uremia with coma and death.

Other complications are: severe bed-sores, boils, abscesses, ulcers and gangrene of the extremities, bronchitis, pneumonia and pleurisy, suppurative parotitis, nephritis, corneal ulcers, profuse sweats, cutaneous eruptions. A tendency to diphtheritic inflammations of the mucous membranes of the colon, especially of the throat and genitalia, may appear. Pregnant women always abort. Painful tetanic spasms of the flexor muscles of the hands, forearms, legs and feet may occur on tenth to fifteenth days of convalescence.

Varieties of cholera include **cholerine,** which progresses as far as the beginning of the collapse state when recovery begins; **cholera sicca,** in which death occurs before the diarrhea begins; and **cholera typhoid,** characterized by fever, dry brown tongue, feeble rapid pulse, delirium, coma and death. During the stage of reaction or during convalescence there may be erythematous, macular or purpuric eruptions.

Blood Pressure. This disease has probably the lowest blood pressure readings of any infectious disease. The blood pressure is a valuable guide in treatment in the stage of collapse and in com-

bating the post-choleraic uremia. A pressure below 70 mm. systolic is a dangerous symptom.

The urine is scanty and albuminous. The urea is slight, gradually increasing to enormous amount. Desquamating renal cells, fatty and hyaline casts are found. Large quantities of indoxyl and sulphates are generally associated with aromatic substances.

The stools are of low specific gravity, with much water, sodium chloride and mucin; are alkaline in reaction, and with a sugar forming ferment almost constantly present. The flocculent sediment contains epithelial cells and leucocytes, shreds of mucus, the comma bacillus in abundance, other bacteria, and sometimes blood.

Treatment. Arrest in the diarrheal stage is often rather easy, but in the stage of collapse is difficult. As soon as the least symptom of diarrhea occurs (in an epidemic) the patient is put to bed. General treatment is necessary but the main factor is to secure a normal circulation through the bowel by relieving the muscular contractions and adjusting the lumbar vertebræ. Thoroughly loosen up the spine from the lowest tip to the head.

No food is to be given during the prostration stage. Bits of ice in the mouth allay thirst; sometimes small quantities of hot water are more comfortable. During the reactive stage, food must be given sparingly but often, of peptonized milk, milk and lime water, or gruels. Vomiting is treated by the general work and by deep steady pressure at the fourth and fifth dorsal vertebræ on the right side. Lavage may be necessary. Cramps are best relieved by friction of the skin over the affected muscles. Fever rarely requires any special treatment.

During the stage of collapse heat must be applied externally by hot applications, hot bricks, bottles, or hot baths. Quick, stimulating movements given through the dorsal area, especially the third to fifth, increase respiration and cardiac action. Hypodermocylsis, enterocylsis or intravenous injection of hot saline solution may be necessary.

Colonic irrigation has been used with some success. Use one to three gallons twice daily of either hot soapy water or one per cent salt solution. Introduce a soft rubber tube through the rectum into the sigmoid, and if possible into the descending colon. Let the water flow very slowly.

Prognosis. The mortality is 20 to 85 per cent. Favorable indications are gradual development of the disease; good constitution and health, and good habits. Unfavorable indications are sudden severe onset in the very young or very old, and in patients addicted to various excesses, and amid insanitary surroundings.

Prophylaxis. Isolation should be prompt. Sterilization of all discharges with chloride of lime or carbolic acid, boiling of all bed,

table, and personal linen as soon after use as possible is necessary. In the event of death, wrap the patient in a sheet soaked in bichloride of mercury 1:1000 solution. Burial must be speedy and private. Attendants on cholera patients should avoid direct contact with other people; should wash their hands thoroughly after contact with the patient; and should protect hair, clothing, and shoes with some covering that may be easily discarded. Non-infected individuals in a cholera district should be instructed to use none but boiled water and milk, and to partake of light, easily digested food that has been kept protected from contamination by flies and other insects.

TROPICAL LIVER

(Active congestion of the liver, active hyperemia of the liver)

Tropical liver is very common in the tropics. It is due to faulty diet, especially overeating of protein food, abuse of alcohol, coffee and highly seasoned foods, lack of exercise, toxic and infectious processes. It is characterized by a sense of fullness in the right hypochondrium, disturbance of appetite and constipation. The patient is irritable and depressed.

The quadratus lumborum and the mid-dorsal muscles are rigid. The ninth and tenth ribs are approximated, especially on the right side. Pain in the back in the region of the seventh and eighth dorsal and under the shoulder blade may be very severe.

Treatment. Correct all lesions by giving vigorous manipulations. Give enema if necessary to cleanse the colon. Allow no food for a day or two, then give strict cellulose diet for at least one week. To prevent recurrence the etiological dietetic errors should be avoided and a suitable amount of exercise in the open air provided. In severe cases a change of climate must be sought.

The disease does not endanger life but lowers resistance to infection and diminishes efficiency and comfort.

(See also Part X, Animal Parasites.)